



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

### About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

AFL9155.5

Map in separate  
cover.



Harvard College Library

FROM

Prof. W. M. Davis.

.....

.....









TREK BOERS IN THE BUSHVELD, by F. D. Oerder, Pretoria, 1905.

A GUIDE 

TO THE

 TRANSVAAL.



THE RIGHT HON. THE EARL OF SELBORNE.  
*High Commissioner for South Africa and Governor of the Transvaal.*



British Association for the Advancement of Science.

Johannesburg Meeting, 1905.

# A GUIDE TO — THE TRANSVAAL.



Compiled and Edited by  
H. T. MONTAGUE BELL AND REV. C. ARTHUR LANE.

---

Printed for the Transvaal Committees of the  
South African Association for the Advancement of Science.

Published by  
The Johannesburg Reception Committee.

---

BARTHOLOMEW & LAWLOR, Printers,  
Johannesburg.

1905.



THE HON. SIR ARTHUR LAWLEY, K.C.M.G.,  
*Lieutenant-Governor of the Transvaal.*

2/9155.5  
~~1 5782.5~~

9560  
-10624  
VT 155



Prof. W. M. Davis.



VISCOUNT MILNER, P.C., G.C.B.,  
*Formerly High Commissioner for South Africa.*

## PREFACE.

---

THE mineral wealth of the Transvaal is so great that a complete description of it would require several large volumes. This Hand-book does not profess to do more than point out concisely some of the more prominent aspects of it, and the leading features of the towns which have rapidly grown up as the result of its development. We have borne in mind that most of the scientists who are honouring South Africa with their presence this year will be unable to spend more than a week in the Colony, and that the avenues of communication are restricted.

Of history, as members of the Association understand the term, there is very little; for, twenty years ago, the site of the most important town was barren veld; and seventy years have not yet passed since Potgieter and Maritz disputed with the Matabele for possession of the country north of the Vaal and south of the Limpopo. The story of the Transvaal as a settlement for white people would be little more to-day than a dull repetition of how a number of Dutch emigrants trekked from Cape Colony in 1836 and parcelled out the land among themselves; were it not that men of science and skill from every part of the civilised world have aided in the development of its natural resources. Without the aid of scientists the Transvaal would still be little more than grazing ground for the cattle of Dutch settlers; but with their aid an industry has been established which is the world's wonder. The commercial interests involved in that industry are enormous, and these have made the towns such as they are.

It is a fashion with many European travellers to compare Johannesburg adversely with towns of similar extent and population in "the old country" which have taken centuries to develop. We expect a little more discrimination than that from the distinguished visitors whom the Transvaal welcomes in August, 1905.

We do not pretend that our commercial metropolis is all that it ought to be; but we are sure that it is rapidly improving. The lofty buildings put up since the war are

submitted as indications of future hope, and we ask that our aims may be judged by them rather than by the tin shanties which served the temporary needs of shopkeepers and residents when as yet the permanence of gold mining was problematical.

At first it was intended to present in these pages only a guide to the Witwatersrand, but at the suggestion of the Pretoria Publication Committee that plan was extended so as to give an idea of the Transvaal generally. But it is only an idea, and has no pretensions to completeness. Restrictions of space have compelled great reduction in the size of available illustrations and much abbreviation of the information supplied. Shortness of time, too, has made it impracticable to get photographs of more distant places, some of which have no resident photographers within many miles, not even amateurs.

So far as was possible within the time allowed the Editors have endeavoured to get information at first hand from people who are known to be authorities with regard to the localities, or the branches of science they describe.

The initials at the end of most of the sections are explained in the Acknowledgments that follow this preface.

As to the order in which subjects are placed in the handbook it should be stated that Pretoria and Johannesburg have priority of place as the capital and the commercial centre. The other larger towns are in alphabetical order, so are the smaller municipalities, this being the customary order in which the different districts are placed in Government publications. The population figures are from the Census returns of April 17, 1904.

B. A. visitors travelling to the Transvaal gold-fields through Natal will pass through Volksrust (page 164), Standerton (page 129), Heidelberg (page 108) and Germiston (page 106); but will not have time to examine those towns. It may be useful for them to have in the handbook a short account of each. The accompanying alphabetical table of contents will enable travellers to find readily a description of most of the places they are likely to have heard about and most of the things they are *desirous to become personally acquainted with.*

The Transvaal contains so many enterprising commercial firms to whom its modernity is largely due that if any were mentioned, even the most notable, the allotted space would be far exceeded, and the Editors would be open to the charge of being invidious. The commercial element and the personal element have, therefore, been reluctantly omitted from the following pages.

Readers may express surprise that so little appears in this Handbook about tin mines and iron mines. The reason is that the discovery and working of those minerals are at present in the initial stages. It is better not to be didactic about things that are incompletely developed. C. A. L.



MINE KAFFIRS' KITCHEN—MEALIE PORRIDGE POTS.



**THEODORE REUNERT, ESQ.,**  
*President (1905) of the South African Association  
for the Advancement of Science.*

**PRINCIPAL CONTENTS.**

	<b>PAGE</b>
General Summary of Transvaal History	I
History of the Capital	9
Description of the Capital	14
Transvaal Museum, Pretoria	20
Zoological Gardens, Pretoria	21
The Pretoria Diamond Fields	23
Growth of Johannesburg Municipality	37
Statistics of Johannesburg	42
Market Prices and Rates of Labour	48
Transvaal Imports and Exports	50
Newspapers of the Transvaal	53
Johannesburg Stock Exchange	54
Streets and Buildings of Johannesburg	56
Government Offices	60
Suburban Townships of Johannesburg	62
Drives in the vicinity of Johannesburg	64
The Wanderers' Club, Johannesburg	66
Racing and the Jockey Club	68
Associations and Social Clubs	69
Theatres of Johannesburg	75
Transvaal Post Office Statistics	76
Johannesburg Parks and Open Spaces	77
Public Library of Johannesburg	82
Transvaal Technical Institute	85
Water Supply of the Witwatersrand	88
The Government Observatory, Johannesburg-	90
Hospitals of the Transvaal	93
Johannesburg Cemetery	94
The Prison and Criminal Statistics	96
Larger Municipalities of the Transvaal (see Alphabetical List)	99
Smaller Municipalities of the Transvaal (see Alphabetical List)	133
Brief History of the Gold Mining Industry	171
General Methods of Mining for Gold	177

		PAGE
Mechanical Engineering on the Mines	-	188
Metallurgical Details of Gold Mining	-	196
White, Black and Yellow Labour	-	217
Processes used in the Extraction of Gold	-	227
Statistics of Gold Production	-	230
Miscellaneous Mining Intelligence	-	232
The Coal Industry of the Transvaal	-	239
Geological Features of the Transvaal	-	244
Geology of the Rand Gold-fields	-	246
Geology of the Transvaal Coal-fields	-	253
Government Mining Returns	-	256
The Modderfontein Dynamite Factory	-	257
Religious Communities of the Transvaal	-	263
The Central South African Railway	-	278
Elementary Education in the Transvaal	-	282
The Transvaal Volunteers	-	285



**TREES AT MOORD DRIFT, POTGIETERSRUST (See page 154).**



## INDEX OF PLACES REFERRED TO.

	PAGE		PAGE
Amersfoort Municipality ...	133	Makapan's Caves ...	153
Amsterdam Municipality ...	97	Malopo District ...	168
Aapies River, Pretoria ...	18, 125	Maraisburg ...	154
Barberton and District ...	100	Marico District ...	168
Belfast and District ...	134-136	Meintjes Kop ...	9
Bergendal Township ...	135	Middleburg Municipality ...	118-122
Bethal Municipality ...	136-137	Modderfontein Dynamite Factory ...	257
Boksburg Municipality ...	99, 108	Mooi River ...	123, 128
Bushveld District ...	168, 169	Moord Drift ...	154
Bushman's River ...	5	Nooitgedacht ...	118
Bronkhorstspuit ...	146	Nylstroom Municipality ...	148-150
Carolina and District ...	137, 138	Ottoshoop Township ...	170
Christiana Township ...	138, 139, 167	Paardekraal Monumenc ...	117
Crocodile River ...	135	Pienaarspoort ...	24
De Kaap and Kaap Valley ...	101, 104, 173	Pietersburg Municipality ...	123, 124
De Lange's Drift ...	129	Piet Retief and District ...	151, 165, 166
Diamond Hill ...	24	Pilgrim's Rest ...	146
Doornkop ...	117, 157	Potchefstroom Municipality ...	11, 125
Duiwel's Kantoor ...	102	Potgietersrust and District ...	152-154
Ermelo Municipality ...	140-143	Premier Diamond Mine ...	23-35
Florida and Florida Lake ...	154, 155	Pretoria Described ...	19-22, 125-129, 158
Fourteen Streams ...	167	Rayton ...	25
Frederikstad ...	161	Rissik ...	23
Gemsbokfontein ...	186	Robert's Drift ...	129
Germiston Municipality ...	106-108	Roodepoort Municipality ...	154-157
Greyfont Township ...	154	Rustenburg and District ...	11, 125, 157, 158
Groot Marico ...	168	Sandspruit ...	167
Haartebeestfontein ...	114	Schoemansdal ...	11
Hatherley Distillery ...	23	Schoonspruit ...	112-113, 161
Hekpoort Valley ...	118	Schweizer Reneke ...	158, 159, 167
Heidelberg Municipality ...	108-111	Springs Municipality ...	159-161
Highveld ...	168	Standerton Municipality ...	129-132
Jacobsdal ...	170	Steelpoort Valley ...	135
Johannesburg Municipality ...	37-55	Vaal River ...	6, 114, 138, 164
Associations and Clubs ...	69-74	Van der Merwe ...	26
Hospitals and Institutions ...	93, 94	Vecht Kopje ...	122
Parks and Play Grounds ...	77-80	Ventersdorp and District ...	161-162
Streets and Buildings ...	56-61	Vereeniging Township ...	162, 163
Suburban Districts ...	62-64	Vogelstruisfontein ...	174
Theatres ...	75, 76	Volksrust ...	140, 164, 165, 167
Kaapsche Hoop and Berg ...	101, 103, 105	Wakkerstroom ...	140, 260
Klein Oliphants' River ...	118, 122	Warmbaths ...	138
Klein Marico ...	168, 169	Waterberg District ...	148, 154
Klerksdorp Municipality ...	111-114, 167	Waterval Boven ...	146
Koedoespoort ...	23	Wilgespruit ...	156
Krugersdorp Municipality ...	114-118	Witkopjesfontein ...	125
Langlaagte Gold Discovery ...	174	Witpoortje Falls ...	157
Lichtenburg and District ...	143-145	Witwatersrand 8, 101, 107, 109, 173-177	
Limpopo River ...	123	Wolmaransstad and District ...	167
Lydenburg and District ...	145-147, 171	Wonderboom Poort ...	19
Machadodorp Municipality ...	147	Zeernst and District ...	168-170
Magaliesberg Range ...	125	Zoutpansberg District ...	123, 215
Magnet Heights ...	147	Zoutpansberg Goldfields ...	1, 7, 136
Majuba Hill ...	165	Zwartkopjes ...	

## ACKNOWLEDGMENTS.

This Handbook has been compiled with the object of placing in the hands of the visiting members of the British Association, 1905, a souvenir of their visit to the Transvaal. To this end they have sought and obtained the services of many representative men and public bodies in order that the book may be a gift from the Colony at large to its visitors. It is, therefore, the gratifying duty of the Editors to bear testimony to the generous response with which their requests for help have been met, and to express their thanks to all those who have so readily given them their assistance in the compilation. The system of identifying contributions with their authors by means of initials has been adopted, and will serve to indicate the measure of the Editors' obligations.

For the opening chapters dealing with the Transvaal and Pretoria the Editors are indebted to the Pretoria Publication Committee, who appointed Dr. Engelenberg, Editor of the *Volkstem*, and Mr. H. S. Cooke, of the Education Department, an editorial sub-committee. The Pretoria Committee has also rendered good service in helping to obtain information from distant districts, and providing many illustrations for these chapters, including the two coloured prints published at the Government Printing Works. To the Government Printer and the Pretoria Committee is due also the official map of the Transvaal, which accompanies this book.

For the section devoted to the gold-mining industry the Editors are under great obligation to several scientific societies of the Rand. The South African Chemical, Metallurgical and Mining Society, the South African Association of Engineers and the Geological Society of South Africa readily undertook responsibility for different chapters in this section, and were able to enlist the services of writers well qualified to treat such special subjects.

In the chapter that deals with the history of the Transvaal gold-fields the writer claims no originality for his contribution. All that relates to the discovery and history of the Witwatersrand Fields has been so ably and fully set forth by Mr. H. H. Webb in his Presidential address to the South African Association of Engineers on June 24, 1903, that it would have been affectation to go outside that account. The Editors' thanks are, therefore, due to Mr. Webb for his permission to incorporate in the chapter whole portions of his interesting address. They have also to thank Mr. E. P. Rathbone, of the Rand Pioneers, for information on this subject.

The facts brought together in the last chapter of the gold-mining section have been drawn from various sources, among which may be mentioned the Chamber of Mines, with the Witwatersrand Native Labour Association, and the Foreign Labour Importation Departments. To these bodies and to many individuals who have kindly given information that they will recognise in these pages the Editors' have to acknowledge their indebtedness.

Thanks are also due to the Mayors, Town Clerks and others who have helped to make this brief description of towns and villages in the Transvaal as complete as it is. In a few instances in this section of the book the contributions are unsigned. But in those instances also the contributions have come through the municipal authorities. The statistics relating to Johannesburg have been furnished by Mr. S. E. Court, the Town Statistician.

Especial thanks are due to numerous photographers who have readily placed their copyright work at the disposal of the Editors, especially Mr. Nissen of Pretoria; Mr. T. Lee of Barberton; Messrs. Duffus Bros. of Johannesburg; Mr. A. Landmark also of Johannesburg; and Mr. L. Bernard Jensen, Bellevue East. The names of photographers of other municipalities were not supplied in time for inclusion in this edition.

H. T. M. B.

## List of Contributors.

Initials on Page	Name and Address
9	G. Schoeman Preller, Pretoria.
14 & 19	Dr. F. V. Engelenburg, Ed. <i>Volkstem</i> , Pretoria.
22	Dr. Gunning, Pretoria.
34 <i>et seq.</i>	Rev. C. Arthur Lane, Johannesburg.
50	S. E. Court, Statistician, Johannesburg.
68	E. J. Platnauer, Johannesburg.
69	F. J. Henley, Johannesburg.
76	L. Rayne, His Majesty's Theatre, Johannesburg.
80	A. H. Stirratt, Sup. of Parks, Johannesburg.
85	J. F. Cadenhead, Public Library, Johannesburg.
92	R. T. A. Innes, Observatory, Johannesburg.
99	E. Davies, Town Clerk, Boksburg.
103	Rev. J. B. Knowles, Mayor of Barberton.
105	T. J. Ross, Kaapsche Hoop.
108	James Mackay, Town Clerk, Germiston.
111	H. Weakley, Ed. <i>Heidelberg News</i> , Heidelberg.
114	J. D. Nesser, Mayor of Klerksdorp.
118	F. A. Cooper, Town Clerk, Krugersdorp.
122	Hutton Watermeyer, Town Clerk, Middelburg.
124	Alexander G. Watt, Town Clerk, Pietersburg.
129	W. S. V. Heskin, Town Clerk, Potchefstroom.
132	W. H. Dobson, Town Engineer, Standerton.
132	F. W. Bird, Government School, Standerton.
134	M. F. Scheffer, Amersfoort.
136	G. Maddocks, Belfast.
137	T. M. Park, Town Clerk, Bethal.
138	H. G. Randell, Carolina.
139	T. G. Pollinger, Christiana.
143	William H. Wilson, Town Clerk, Ermelo.
145	C. B. Maartens. Town Clerk, Lichtenburg.
147	Col. F. H. Damant, C.B., R. M., Lydenburg.
148	W. C. Janson, Machadodorp.
152	W. A. Humphries, Town Clerk, Piet Retief.
154	G. H. Matthews, Education Dept., Potgietersrust.
157	J. S. Mitcham, Town Clerk, Roodepoort.
158	H. Kember-Cook, R. M., Rustenburg.

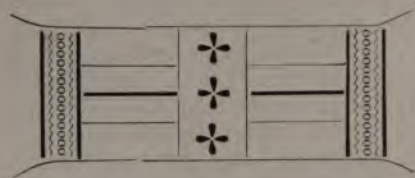
Initials on page.	Name and Address.
159	W. E. Williams, Schweizer-Reneke.
161	H. Richardson, Town Clerk, Springs.
162	T. O. Hagan, Ventersdorp.
163	T. N. Leslie, Mayor of Vereeniging.
165	F. M. Scheffer, Town Clerk, Volksrust.
167	Major W. G. Bentinck, R.M., Wakkerstroom.
168	F. W. Konig, Town Clerk, Wolmaransstad.
170	H. Dietrich, J.P., Zeerust.
177	H. T. Montague Bell, Johannesburg.
195	J. A. Vaughan, R.N., Retd., Johannesburg.
217	T. Lane Carter, Luipards Vlei.
226	S. J. Jennings, M.A.I.M.E., Johannesburg.
244	Ernest Williams, Johannesburg.
255	J. G. Lawn, A.M.I.C.E., Johannesburg.
262	W. Cullen, Dynamite Factory, Modderfontein.
270	D. W. Rossiter, Johannesburg.
270	Rev. C. Phillips, Johannesburg.
272	Rev. W. Martin, D.R.C., Braamfontein.
274	Rev. Dr. J. H. Hertz, Johannesburg.
275	Rev. R. B. Douglas, Jeppestown.
277	Rev. Father de Lacy, Johannesburg.
278	Rev. Amos Burnett, Johannesburg.
285	T. G. Ligertwood, Johannesburg.
288	Lieut. E. A. Bradford, Johannesburg.



JOHANNESBURG IN THE EARLY DAYS.



GEORGE COCH, ESQ.,  
*The Mayor of Johannesburg, 1905.*



ANDREW JOHNSTON, ESQ.,  
*The Mayor of Pretoria, 1905.*

Government Printing Works three-colour process.







# THE TRANSVAAL.

---

## INTRODUCTORY.

The Great Trek or migration of Boers from the Cape Colony during 1835-6 and subsequent years, may very properly be regarded as the starting point in the history of all the Northern States, including Natal. During this period the Southern Colony was left by many hundreds of its inhabitants, who, crossing the border, founded the Orange Free State, Natal and subsequently the Transvaal. The causes which conduced to this remarkable movement were many, but may be summarised as a deep sense of the injustice of the British, of their indifference to the sufferings of the border-colonists, and their sympathy with the black races. This was engendered chiefly by the unchecked depredations of the native tribes, the leniency shown to the robber bands of Hottentots and Amakosa, who devastated the land, the Slachtersnek execution, the enormous official depreciation of the paper currency in circulation at the time of the annexation to Great Britain, the enfranchisement of the coloured races, and the unfair way in which the Slave Emancipation Act was carried out in South Africa.

It is well known that, long before Livingstone "discovered" the Zambesi River and its famous falls, these places had been visited by Boer hunters, many of whom left the Colony before the great expatriation took place. But the first organised body of "Voortrekkers" to leave the Colony was composed of some fifty persons under the leadership of Louis Trichardt. It was soon after joined by a second party, and together they reached the Zoutpansberg



GENERAL VIEW OF PRETORIA.

in 1836. The majority were murdered by natives, and the survivors eventually made their way to Delagoa Bay, and thence to Natal. The second party, under Hermanus Potgieter, reached the depopulated regions north of the Orange during the same year, and was followed by various other parties each under the leadership of some prominent man. Their first care was to obtain a cession of the land between the Vet and Vaal Rivers—part of the present Orange River Colony territory—from the Bechuana chief, who only partially occupied it. This was secured at the price of some cattle, and on condition of their affording him protection from his foes, the Amatabele.

The emigrants, fancying they had reached a country suitable for settlement, scattered themselves with their flocks and herds over the wide ranges of open unoccupied country. Their fancied security, however, was not of long duration. Two large marauding parties of Amatabele sent out by the dreaded Moselikatse, surprised and massacred several detached parties of farmers. The remainder, dreading a similar fate, hurriedly assembled and formed a "laager" of their waggons, within which they placed the women and such of their belongings as it could contain, while Potgieter, with a mounted commando, awaited the approach of the enemy outside. On the 29th of October, 1836, they were attacked by a large Matabele impi, and after a fierce struggle gained a signal victory, but were, at the same time, deprived of nearly all their cattle and sheep.

Meanwhile, other emigrants had arrived on the scene from the Colony, and some of these under Pieter Retief, now crossed the Drakensberg into the present Natal, while most of the others under Gerrit Maritz and Potgieter, decided to push further north.

On the broad veld, rolling away on either side of the railway which bears the modern traveller northward, far from the busier haunts of man, still dwell descendants of these pioneers who first carried the white man's burden into the land which the visitor enters on crossing the Vaal River; the land which he probably knows primarily as one of gold and precious stones.

*But little they knew and less they recked of these*

things, who first trod its virgin soil. If fate or fortune had decreed that the reader could have crossed the Vaal River a little more than half a century ago, he might have seen their white-tilted laagers of waggons and tents, halting along its banks or fording its grey waters, on their march northwards into an unknown land beyond. The silent panorama of hill and dale, now opening on every side, teemed with Nature's myriad forms of life, including springbok (in such vast droves as often to stop the emigrant



TRANSPORT WAGGON FORDING A RIVER.

caravan), wildebeest, zebra, and other animals of a more ferocious order. Man only was wanting; for the preceding decade had witnessed his almost total annihilation at the hands of the savage Amatabele, who then held supreme sway in the far north, contenting themselves with occasional raids on the fugitive nomads who lingered in the mountain-fastnesses to east and south.

At the time when Retief crossed into Natal, Dingaan, successor to the ferocious and bloodthirsty Tsjaka, claimed *the whole territory from the Drakensberg to the sea, as far north as the Umzimvubu or St. John's River.* The greater

part of this country was depopulated and the rest but thinly occupied by native tribes who had been almost obliterated by Tsjaka. A few English traders, living at the Port, and some mission families were all the Europeans who occupied the land. Retief was cordially welcomed by them and encouraged to interview Dingaan and obtain permission to settle with his followers in the country. This he at once proceeded to do, and the Zulu monarch agreed to grant the desired permission on condition that certain cattle stolen from him by a neighbouring chief, were restored by the Boers. After this had been effected the great body of emigrants in three divisions, with nearly a thousand waggons and great flocks, began their descent of the mountains and spread themselves over the country. Everything seemed promising for the final negotiations with the Zulu king, and accompanied by seventy horsemen with some thirty servants, Retief once more visited Dingaan in his stronghold, Ungunginhlovo. A document was prepared (the original may be seen in the Pretoria Museum) to which Dingaan affixed his mark, witnessed by the most prominent of his indunas or advisers, ceding to the emigrants all the land between the Tugela and the Umzimvubu northwards, "as far as it was in his possession" and from the Drakensberg to the sea, "as their everlasting possession."

Completely thrown off their guard by the friendly attitude of the king, the emigrants consented to an invitation to witness a military display by some of the Zulu regiments, and it was while so engaged that every one of the party was butchered in cold blood at a sign from the treacherous savage.

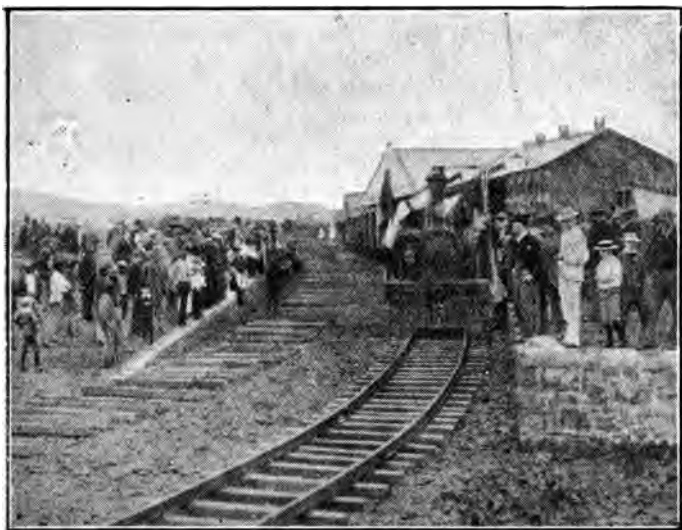
As a sequel to this, Dingaan despatched an impi of 10,000 to 12,000 warriors to fall on the scattered Boer encampments along the banks of the Tugela and Bushman's Rivers. Simultaneously these encampments were attacked in the darkness of the night, and men, women and children ruthlessly massacred before they were well aware of the dreaded foe. Altogether 41 men, 56 women and 185 children with about 250 coloured servants were thus barbarously slaughtered. On the Bushman's River, as the day advanced, the farmers formed a laager and defied the *savages*, and at last beat off the Zulus with great loss.

A first attempt under Maritz, who had joined his kinsmen in Natal, and Piet Uijs, to punish the Zulus, proved futile, and not until the arrival of one of their most intrepid leaders, Andries Pretorius, assisted by Landman, did they succeed in utterly breaking the Zulu power. The Zulu army was routed, and at the royal kraal were discovered the remains of the unfortunate Retief and his party, about eleven months after they had met their tragic death.

On his return, Pretorius learned that a British military detachment had taken possession of the Port. The object of this occupation was to stop supplies of arms and ammunition reaching the Boers, so as to prevent them from setting up an independent government of their own. These troops, however, were eventually withdrawn, and a period of peaceful development ensued, during which the Boers organised a proper system of government, built several of the older towns of Natal, and established peace with the natives. In 1841, the Governor of Cape Colony, by proclamation, announced the intention of Her Majesty's Government to resume the occupation, and a protracted armed struggle was the result, which eventually ended in the submission, under certain conditions, of those farmers who remained in Natal. Most of them, however, quitted the country to join those whom we left crossing the Vaal river five years previously.

On the almost bloodless conquest of the Transvaal followed a brief period of settlement, during which some of its oldest towns were established, its several communities united, a temporary system of government organised, and recognition of its complete independence by Great Britain secured under the Sand River Convention of 1852. The emigrant leaders who brought about these results—Potgieter, Pretorius, and Maritz—were shortly afterwards succeeded by several younger men, whose main endeavours were directed toward the formal establishment of Constitutional Government. Five years after the signing of the Convention this was attained; and M. W. Pretorius, a son of the pioneer leader, was elected first President of the new S. A. Republic. Then succeeded a "*Sturm und Drang*" period, chiefly characterised by more or less serious

native insurrections, internecine dissensions, and the strife of individuals and factions for place and power, culminating in the election of President Burgers (1872). Under his government the Delagoa Bay railway policy, which had been the dream of Potgieter and others before him, was actively initiated; and the Lydenburg and Zoutpansberg goldfields first came into prominence. President Burgers visited Europe in 1875, and concluded a railway treaty with Portugal; but the linking of the Transvaal with its



FIRST TRAIN ARRIVING AT PRETORIA.

natural outlet to the sea was only accomplished many years afterwards, by his successor, Paul Kruger.

After the establishment of the Republic, and prior to 1899, hardly a year passed without witnessing some native trouble and consequent defensive or punitive measures on the part of the whites. This fact is often lost sight of when the wide difference is remarked between the development of

the country's agricultural and mineral resources. On his return from Europe, Burgers had at once to face the Sekukuni Rebellion; and on the 12th of July, 1877, there followed the first annexation of the Republic to Great Britain, a *coup d'état* to which he submitted under protest.

During the British interregnum—which was otherwise identified with the prosecution and successful conclusion of the Sekukuni trouble and the inauguration of various changes—two Boer deputations were sent to England to plead for the retrocession, but quite without avail. The close of 1880 witnessed an armed struggle for independence. This first Transvaal Anglo-Boer war resulted in the Convention of Pretoria (1881), eventually superseded by the London Convention (1884), and the restoration of the Republic.

Wars with native tribes form the chief events during the period immediately succeeding this restoration. Towards the close of 1885, the main reef was discovered on the Witwatersrand; early the following year nine farms were proclaimed as public diggings. Other important discoveries were made, and there ensued an epoch of transmutation and development so rapid and far-reaching that it certainly stands unique in the world's history. Once its vast natural riches had been proved, capital poured into the country, and men flocked to the "fields" from all quarters of the globe, constituting a great cosmopolitan community totally distinct from, and with aspirations widely divergent from those of the older population, which the newcomers were soon to outnumber entirely. The veld under which the main reef had lain undisturbed so long was transformed in a few years into a populous district, spreading itself along the entire forty miles of reef. A strong impetus was then imparted to every branch of commerce and industry, all of which seemed to have attained to a zenith of prosperity within barely two decades after the first sod was turned.

But there were, nevertheless, gathering together the elements of a cataclysm, which was soon to convulse this sub-continent and, in President Kruger's prophetic words, "*to stagger humanity.*" But here this brief *resumé* of the



evolution of a nation—whose scattered members still dwell just beyond the horizon on either side of the railway track—may well be terminated.

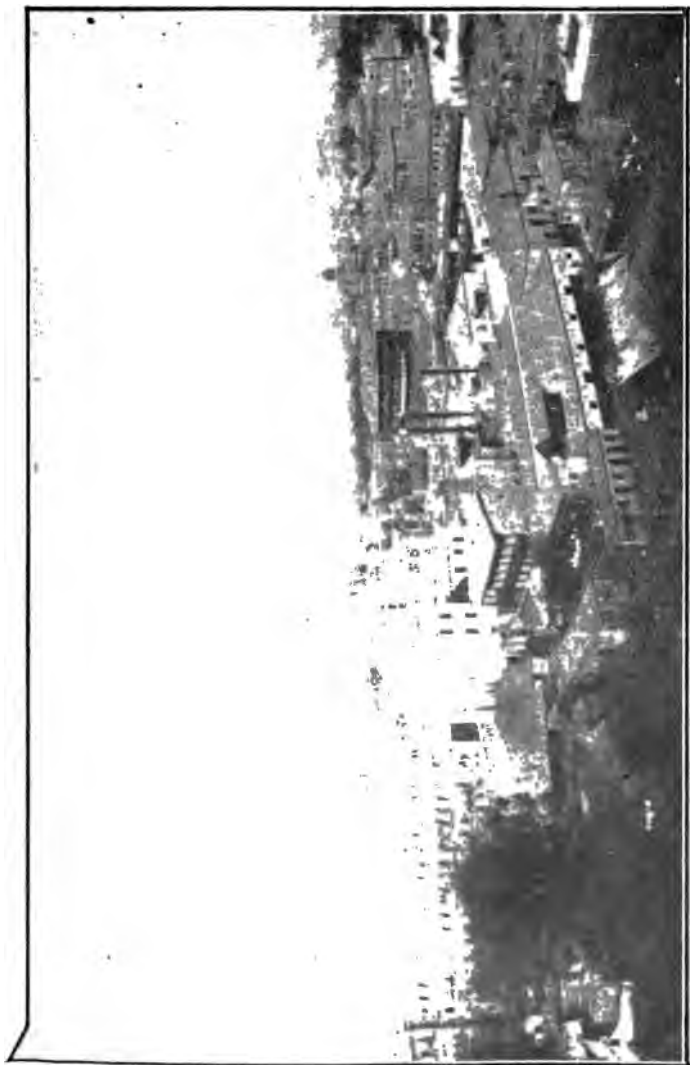
What followed—the events which led up to the Jameson Raid, the Three Years' War, and Vereeniging on the Vaal River—these are matters of contemporary knowledge. G. S. P.



CHURCH STREET, PRETORIA, IN EARLY DAYS.

## PRETORIA.

Flintstone implements are said to have been found in the neighbourhood of Pretoria. Ancient workings all round the town go to prove the antiquity and industrial importance of the district. The remains of stone cattle kraals on Meintjes Kop, a hill overlooking the capital, testify, according to native tradition, to the reign of Mpongo, the "Blood trail", the "Treasure", "Blood" & "Treasure".



THE CENTRAL PORTION OF PRETORIA IN 1904.

origin, who, just before the great trek, devastated the country. But no Phœnician, Chaldæan, or even Arabic descent is claimed for their town by the present inhabitants. Its existence is the result not of economic necessity nor metallurgical circumstances, but of the political consolidation of the South African Republic. This came about shortly after the Sand River Convention (1852), when the different inter-independent Boer communities, centering in the towns of Potchefstroom, Lydenburg, Schoemansdal and Rustenburg, were crystallised into a homogeneous whole. It was found essential to have a capital easily accessible for the whole State; and, as neither of the above-named towns answered this purpose, the offer of the then President, M. W. Pretorius—owner of the farm on which the capital was laid out—was accepted by the Volksraad, and the name "Pretoria" was given to it as a complimentary tribute to the donor. The Boers, in this instance, again proved to be sagacious townfounders. An abundant water supply, fertile and easy soil, gently sloping ground, pleasant climate and agreeable surroundings, ensure for the Transvaal capital a healthy, prosperous and lasting life.

Several years elapsed before the actual acceptance of President Pretorius's offer obtained practical results; for the administration of the State, however rudimentary it may have been, had taken root at Potchefstroom, then the chief commercial centre of the country, where one could walk on market days between long rows of elephants' tusks, valuable hides, skins, and ostrich feathers: the spolia of intrepid Boer hunters, who knew all about the secrets of the Central African continent long before Livingstone "discovered" them.

At length the inertia of the Potchefstroom bureaucrats was conquered by a simple plan. One propitious night the Government printing press (then the only printing press in the country) and other material necessary for the issue of official documents, were "by order" loaded on an ox waggon and removed to Pretoria. Not the sword, but a waggon-load of typographical paraphernalia, turned the scale in Pretoria's favour. This happened in the early sixties of the last century.

The infant life of Pretoria was uneventful. Those who remember it describe the miniature capital as consisting of a straggling group of white-washed, thatched-roofed, more or less spacious, cottages, separated by rose-hedges, and inhabited by a busy little community, in which Englishmen, Hollanders and Germans were numerously represented, many of them cultured and rich in social accomplishments; and although a European mail reached the town on the banks of the Apies River only once a month, people were exceedingly well posted in all matters of oversea politics and general intelligence. An occasional sitting of the Volksraad, or the quarterly *Nachtmaal* (Communion Service attended by the rural population *en masse*) varied the monotony of Pretoria's *toujours perdrix* existence. Even the sensational event of a short "civil war" was not withheld from it, and is kept in memory by the name "Blood street," in the southern part of the town, where a few rifle shots were exchanged between the opposing political groups with the result of "one man wounded!"

In 1872 came President Burgers. Then followed the Pilgrim's Rest gold discoveries, the Sekukuni War and, in 1877, Sir Theophilus Shepstone with the annexation. The Delagoa Bay railway connection—already decided upon by the Volksraad, and surveyed by Portuguese engineers—was pigeonholed, and the country's prospects became stagnant. Pretoria's importance then centred itself in its little garrison and small official world. The hunting trade had worn itself out; the Pilgrim's Rest fields collapsed, and unrest increased amongst the inhabitants of the State. At the end of 1880 war broke out, martial law was proclaimed, and the townspeople were quartered in the military camp at the upper end of the capital, which had been invested by a Boer commando. The "siege" lasted one hundred days, and several sharp encounters took place on the southern and eastern outskirts. In the oldest part of our cemetery may still be seen the graves of many a British soldier "killed in action." On the 8th of August, 1881, the Peace Convention was signed at Pretoria, and again the people turned their eyes to the east, where the harbour of Lourenço Marques held out not only the shortest and cheapest

railway connection with the sea, but also deliverance from the highly exacting customs policy exercised by Natal and Cape Colony. In 1884 a railway concession was granted to a Netherlands syndicate, afterwards known as the "Z.A.S.M."; but several years passed by before the works were started. The famous MacMurdo difficulty arose, which developed into an international complication; and as soon as the Portuguese Government had (1889) taken possession of the line, already built by MacMurdo as far as the



NACHTMAAL CAMP IN CHURCH SQUARE, PRETORIA.

Transvaal border, President Kruger ordered the immediate commencement of the works in the Transvaal territory. In 1895 the first train steamed into Pretoria.

Meanwhile, the development of the Witwatersrand as a gold-producing district had resulted in a sudden expansion of the State's administrative body, as centred within the capital. The original thatched-roofed building, which for so many years had housed the Volksraad and the Executive, was replaced during 1892 by the present Government Building. Large railway works were also erected, as well

as barracks for the tiny standing army, and other public institutions, such as schools, hospitals, a State printing establishment, a zoological garden, a museum, etc., arose in quick succession. The prosperity of the town increased gradually, keeping pace with the general development of the State.

Visitors will not expect to find in a book of this character any details of the Anglo-Boer War. It will suffice if we remind readers that on June 5, 1900, Lord Roberts' troops entered the capital, and that two years later Pretoria again witnessed a Peace Conference between representatives of the Boer people and of the British Government. This Conference terminated in the Treaty of Vereeniging, which was concluded on May 31, 1902.

Pretoria had passed through some rudimentary forms of municipal rule before the war, but only in 1903 was full local self-government granted to the town, of which it is proving itself quite worthy by an honest and intelligent administration. The latest feature of Pretoria's development is its expansion into many thriving suburbs, which—once the inter-communal traffic is established—will tend to make it one of South Africa's most interesting places of abode.

F. V. E.

---

### The Town.

The population of Pretoria is about 35,000, and the town's elevation above the sea level 4,500 feet. Pretoria is the commercial centre of the northern part of the Transvaal and the principal seat of the country's administration. Its distance from Delagoa Bay is 350 miles, from Durban 511 miles, from Port Elizabeth 740 miles, and from Cape-town 1,041.

*Public Buildings.*—Most of these are to be found around and near the Church Square, which derives its name from a Dutch Reformed Church, which until recently stood in its centre. It was removed in consequence of the Government having purchased before the war Church and Square from the original proprietors.

*The Government Buildings* occupy the south-western

part of the square and were erected in 1892 at a cost of £250,000. They contain the offices of the Lieutenant Governor and several Departments, as well as the meeting hall of the Legislative Assembly, to which the vestibule leads. When the erection of these buildings was decided on, provision was made only for a ground floor, this being thought appropriate for the needs of the time. But during the building operations it was found advisable to enlarge the space, and an upper floor was added to the plans.



THE GOVERNMENT BUILDINGS, PRETORIA.

In 1898 another Government Building was erected behind the first one, specially adapted for the Deeds Office and the Surveyor General's Department.

The Law Courts occupy the north-western corner of Church Square and were completed in 1899. On the occupation of Pretoria by Lord Roberts these courts were used as a military hospital, and only after peace had been made, were they for the first time formally given to their proper destination. They contain a spacious *salle des pas perdus* and three halls for the Supreme Court's sessions.

Between the above-named buildings the Post and Telegraph Office is situated. The erection of larger and more suitable premises is in contemplation.

The Church Square further contains several Banks, a theatre and many institutions of a commercial character. The municipal administration has taken in hand the artistic ornamentation of the square, and a monumental fountain, similar to one now adorning one of the promenades of Glasgow, Scotland, has been presented by Mr. Samuel



THE LAW COURTS, PRETORIA.

Marks, who, some years ago presented the Kruger Statue, the pedestal of which was recently removed from Church Square to a park opposite the cemeteries, whilst some of the bronze figures, forming part of the statue, are to be found at the Brompton Barracks, Chatham, England.

The town contains, besides the buildings already mentioned, several churches, more than one of which may lay claim to pleasing and interesting architectural features. *The cathedral of the Church of England* is dedicated to St.



Alban; the largest church—at the corner of Koch and Vermeulen Streets, is that of the United Dutch congregation; the Roman Catholic congregation own some extensive buildings, including a large school, to the south-west of the Square; the Jewish Synagogue, recently completed, is to be found not far from the central square along Market Street North. Then there are church buildings representing the Wesleyan community, two other Dutch congregations, the Baptist, the German-Lutheran and several other communities.



THE WESLEYAN CHURCH, PRETORIA.

The street from Church Square, leading westward, passes the dwelling-house of the late President Kruger, situated opposite the church where he used to offer his devotions. This house now belongs to his children, and may one day be converted into a Kruger Museum.

A little further are the cemeteries, in one of which the grave of Prince Christian of Schleswig-Holstein, grandson to Queen Victoria, is to be found. Prince Christian died in Pretoria from fever in 1900. One of the adjoining

cemeteries contains the graves of the late Transvaal Presidents, that of Paul Kruger included. The street from Church Square, leading northward, brings the visitor to the Zoological Gardens and the Museum.

Church Street East passes the principal shops and warehouses of the town, and leads across the Apies River to the residential suburbs Arcadia, Sunnyside, Brooklyn, Fairview and Bryntirion, the latter being principally laid out for residences of our State officials. The dwelling-house



THE GYMNASIUM, PRETORIA.

for the Lieutenant-Governor, which reminds one of the Cape Dutch style, will soon be finished.

To the south of the town a road leads to the sources of the Apies River, which provide the capital with plenty of pure water. The south-western part is chiefly occupied by Military Barracks, the Hospital and the Prison Buildings. Further away, on the hills, are to be found the Cantonments of the Garrison.

The Public Library, in Church Street East, possesses *an interesting collection* of books and maps on South Africa.

The town is still in a state of transition, and every year changes and improvements may be noticed. The streets and houses are lighted by electricity, provided by the municipal authorities. Electric tramways are in contemplation.

Of <sup>the</sup> Gradually the country around Pretoria is being filled with houses and gardens, for miles away from the centre. Special mention may be made of the Wonderboom, a large wild figtree, situated on the northern slope of the Magalies-



THE WONDERBOOM, PRETORIA.

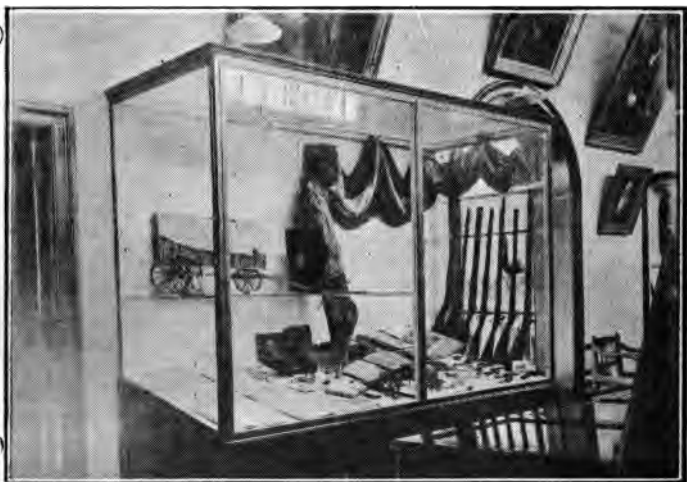
bergen and accessible through a fine "poort," through which the railway to Pietersburg has been built. The tree has grown to its present vast size owing to its heavy wide spreading branches gravitating to the ground and there taking root. From the newly rooted branches fresh trunks have grown, until a large clump of trees are connected with the parent stem.

The Delagoa Bay line runs in an eastern direction and passes many miles of pleasant country before reaching the "high veld."

F. V. E.

### Transvaal Museum, Pretoria.

The Transvaal Museum was started on a very small scale in 1892, mainly through the initiative of Dr. Leyds, then State Secretary of the South African Republic. The few articles brought together at that time were housed in a small room on the top floor of the Government Buildings, but this place soon became too small, and the collection was transferred to the Old Market Hall, where it remained till 1902. The Museum is a Government Institution, and



RELICS IN THE PRETORIA MUSEUM.

derives no income whatsoever from the public. A new and commodious building was started by the late, and completed and equipped by the present, Government, the building costing about £25,000 and the fittings over £14,000. There is a Board of Management, nominated by the Government.

The main object the managers have in view is the collection of all that is connected with South African History, Natural History, Ethnography, Art, etc. The *collection of mounted Mammals* is, as yet, far from com-

plete, but nearly all known species are present in the skin collection; and as soon as time and space are available others will be mounted. Among the rarest specimens must be mentioned a very large white rhino cow, presented by Mr. Carl Jeppe. This large mammal is nearly extinct, and only by extreme care on the part of the Natal Government have 8 or 10 specimens survived to the present day.

The collection of South African birds comprises some 2,700 specimens.

The insect collection comprises some 100,000 specimens, the orders of Lepidoptera, Coleoptera, and Hemiptera being very well represented; the South African Rhopalocera are nearly complete.

The botanical collection consists of about 5,000 specimens; of which about 1,000 are natives of the Transvaal, the others South African.

The ethnographical and historical departments contain invaluable treasures; the ethnographical being enriched by the fine collection of Bushman stones collected during a lifetime by the late Mr. George Leith in all parts of South Africa. Bibles, calendars, day books, etc., of old Voortrekkers are among the numerous relics of past ages.

The first Honorary Director was Dr. G. H. Breyer; since 1897 Dr. J. W. B. Gunning has been the Director.

---

### Zoological Gardens, Pretoria.

The Zoological Gardens are placed under the same Board of Management as the Museum, although their financial administration is on entirely different lines. Whereas the Museum is a Government Department, under the Colonial Secretary, the Zoological Gardens only receive a grant in aid from the Government, which is supplemented by voluntary contributions yearly subscriptions and proceeds of the entrance gates.

The collection of living animals was started in 1899, on a very modest scale in the backyard of the Market Hall on Market Square. Soon, however, the few square yards available there were too small; and during the first months

of 1900 the nucleus of the collection was brought down to "Rus in Urbe," where the present Museum and Zoo are situated. As the country was in an unsettled state for more than two years but little progress was possible in the beginning ; but since the declaration of peace in 1902 the work has been taken in hand in earnest, and a fair collection of animals from all parts of the world has been brought together. The main object here, as in the Museum, is to collect South African species first, but it is found more easy to obtain animals from other parts of the world than South African antelopes.

The area at present in use is about 10 acres, but 19 acres are enclosed, and a further 16½ acres have lately been handed over for future extensions of the Gardens.

The climate seems very favourable for the breeding of antelopes and deer ; no less than 9 species of deer and four of antelopes, having bred during last year, have all reared their young.

The office of Director of the Zoological Gardens and the Museum is at present combined in the same person.

J. W. B. G.



IN THE ZOOLOGICAL GARDENS, PRETORIA.

## PRETORIA DIAMOND FIELDS.

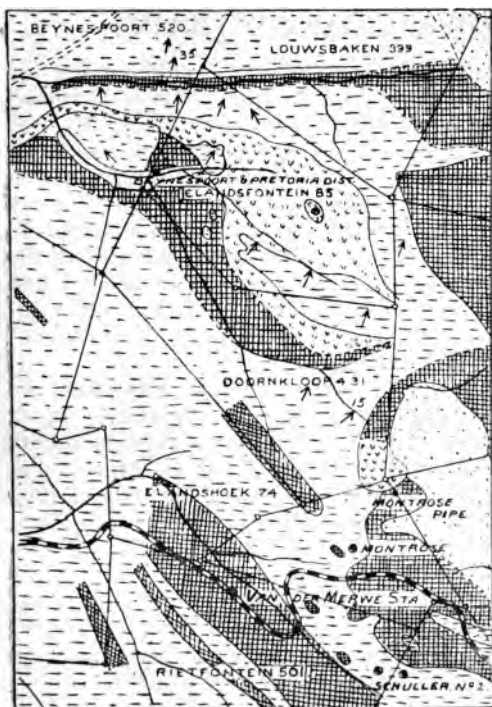
Diamonds are next in importance to gold among the chief products of the Transvaal, and the Premier Diamond Mine is one of the wonders of modern discovery. It was an untilled field in 1902, and is now a thriving centre of industry, some twenty miles north-east of Pretoria, with a railway station "on the premises." The railway journey from Pretoria is not without interest, for the line passes to the south of the capital, through what are called the "Pretoria Diamond Fields," containing both ancient and modern workings payable in a small way, but quite insignificant compared with the thousands of "claims" controlled by the Premier Company.

Starting from Pretoria by the Delagoa Bay route, the traveller skirts the pleasant suburb of Arcadia. *Rissik* is the first station passed, after which the scenery is bare and brown, save for an occasional blockhouse, a few kopjes and a farmstead, until *Koedoespoort* is reached. Proceeding thence, a glimpse of the wide veld may be seen northwards, through a kloof or pass, from which the last-mentioned township takes its name. On the other side (south) of the line are plantations and farmhouses. Then the line crosses a stream and passes some native huts, after which the "mealie patch" type of agriculture comes into evidence. The range of hills north of the line form part of the famous Magaliesberg range. A considerable amount of forestry has been in progress hereabouts, and south of the line great patches of trees, about ten years old, present themselves.

Then we come to *Hatherley*, with its pretty homesteads and orchards, extortionate Asiatic fruit-vendors, and inquisitive native children. South of the station is Hatherley Distillery, which used to have a monopoly for producing spirituous liquor. The British Government gave the owners a large sum to end the monopoly, and then

closed down the business. Various opinions are freely expressed as to the wisdom of this arrangement, the apparent effect has been to transfer the monopoly to European importers and to destroy an

important local industry. After Hatherley the next stop is *Pienaarspoort*. Between these stations south of the line may be seen excavations where prospectors have been at work searching for "pipes." Close to *Pienaarspoort* is a brickfield, and then a large plum orchard, sheltered by a kopje. The line then goes through a kloof, by the side of streams which enable "mealies" (Indian corn) to grow abundantly. There is very little of any other sort of



ALLUVIUM. WATERBERG SANDSTONE  
 PRETORIA QUARTZITE INTRUSIVE DIABASE  
 FELSITES. DIAMOND PIPE  
 SCALE 2.34 MILES TO ONE INCH

farming. A steep incline follows, and to the south of the line is the famous *Diamond Hill* battle-field. Northward, as we reach *Van der Merwe* station, are several typical *veld* roads; showing how independent the settlers are of



any defined track. If in rainy weather one track is bad the transport rider turns off on to the grass, there being no hedges, ditches, or fencing, and thus half-a-dozen veld roads may sometimes be seen side by side for considerable distances. After leaving Van der Merwe a number of presumably self-sown mimosa bushes are noticeable, which thrive on diamondiferous soil when other trees will not grow. Most of these trees have a very scrubby appearance, but a few are well grown. The railway curves a good deal here, to ease the incline, so that close by on the left hand may be seen the station which was passed a mile away on the right. Passing tree plantations both sides of the line and more diamond prospecting works, the train draws up at *Rayton*, a new station opened early in 1905, as a junction for the short line to "Cullinan." At present (June, 1905) Rayton consists of a few tents, half-a-dozen tin shanties used as stores, post office, etc., and some huts built and thatched in native style. When one thinks that Johannesburg was no bigger than this in 1886, and minus a railway, it would be rash to doubt that Rayton may become the centre of numerous diamond propositions in several years time. Opposite Rayton Post Office, about 400 yards to the north of the line, is a small mine shaft belonging to the Montrose Diamond Mining Company, whose "claims" extend all the way back to Van der Merwe Station. Behind the Post Office some 600 yards to the south of the line is another shaft on the property of the Kaalfontein Diamond Mining Company. The Schuller Mine is also in the vicinity. At present these and other diamond mining estates are comparatively small concerns. The branch line from Rayton to Cullinan is about six miles long, and was laid with very little trouble on the veld, up hill and down hill, just as the land happens to be. The country hereabouts is in some parts like a Canadian prairie, and in other parts like a Yorkshire moor. Trees are being extensively planted, and some are already "grown up." Near *Cullinan Station* a busy scene meets the eye, for we are in the midst of numerous tents and corrugated iron sheds, while herds of grazing cattle intimate the possibility of fresh milk. A great dam, full of refuse from the diamond

washing process compels attention, for the weight of mud burst the dam in July, 1905, and caused considerable inconvenience. Numerous children playing about under the eyes of gossiping matrons proclaim the married workers' quarters. The railway station is named after the original promoter and first General Manager of the Premier Diamond Mine. The story of his find sounds like a chapter from romantic fiction. The farm called "Elandsfontein 85" was in the market. Being in the vicinity of other diamond



THE FIRST DAY'S WORK ON THE PREMIER MINE.

propositions, it was not unlikely that diamonds might be found on the farm, and therefore a fancy price (£56,000) was put upon it by the owner. To suggestions that an inspection or survey of the farm was desirable, the answer was always "No; take it or leave it, and the price must be paid in hard cash." None of the Rand lords would buy it on those risky terms; but Mr. Cullinan, having some knowledge of the land formation at Kimberley and complete confidence in his own judgment, determined to *buy that farm*, which, with the co-operation of a few

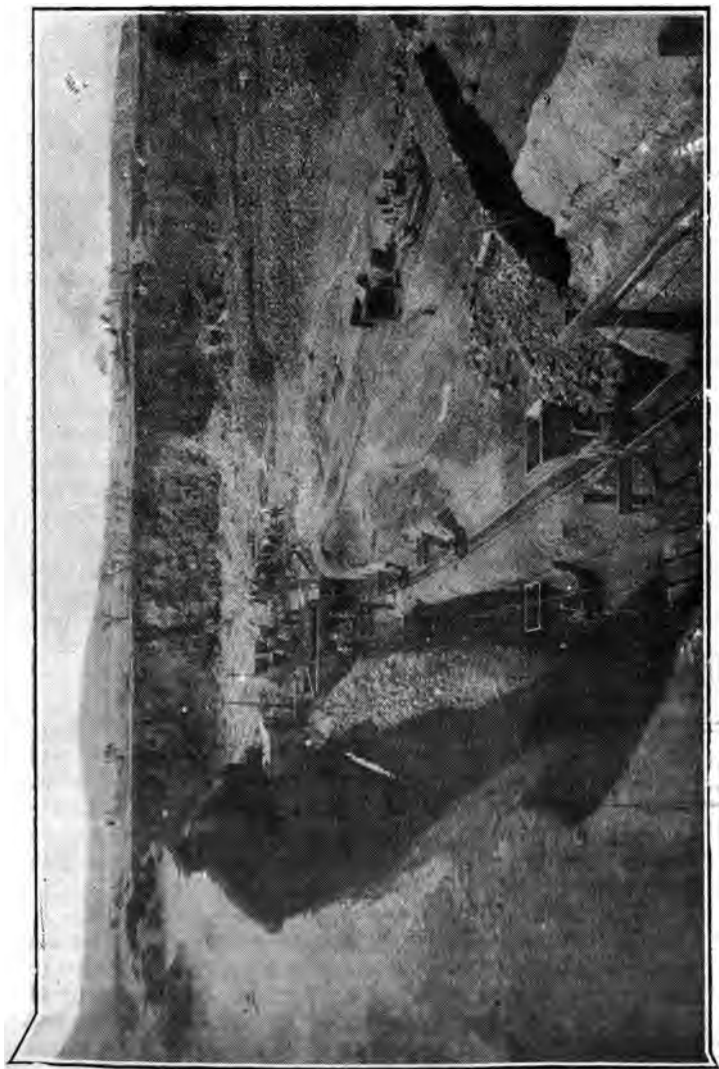
friends, he was able to do. The capital raised was £80,000, which has been returned to the shareholders several times over in dividends within the first three years' occupation of the property, to say nothing of the amount received by the sale of shares. When it was known that an unusual quantity of diamonds had been obtained from alluvial workings, the ruling powers took cognisance of the find, and passed a special law which reserved to the Government 60 per cent. of the profits of all diamond mines which were over 100 claims in extent (a 'claim' is 30 feet square). As no other mine in the Transvaal had a "pipe" equal to 100 claims, this was clearly special legislation, and as such, it has been very much criticised.

The old Transvaal mining law gave the discoverer of a diamond mine a selected one-eighth of the area. The public could then step in and peg off all the remaining area. This would lead to a repetition of Kimberley's experience: the ground of one claim caving in on another and above all, the rush of diamonds threatening to ruin the market, and make diamond mining unprofitable. (Hence Kimberley's amalgamation of interests.) Accordingly, the present Government said—We will be 'the public' to take these remaining claims, in order to prevent such a disaster (at Kimberley it proved, unquestionably, a disaster). Mines are allowed first to deduct the cost of equipment, and in the case of the Premier Mine the equipment has been lavish.

If this had been done uniformly, there would have been less complaint. None of the other diamond mines of the Transvaal pay anything out of their profits to the State, whereas the Premier Mine pays a very large sum to the Treasury, and there is considerable controversy among members of the legislature as to what should be done with the money.

The Premier Mine measures up into 3,500 claims.

GEOLOGICAL.—The geological formation of the Pretoria diamond fields was well described in a paper contributed to the South African Association for the Advancement of Science at its meeting in 1904, by Dr. Kynaston and Mr. Hall.

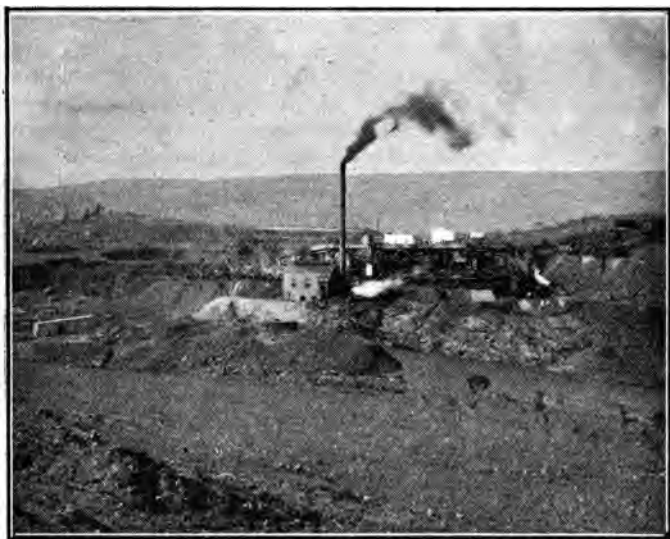


THE PRESENT WORKINGS OF THE PREMIER MINE.

The formation is found between the Dolomite and the Waterberg Sandstone. It is composed of quartzite and shale, with intrusive sheets of diabase and other allied igneous rocks. The quartzites are mostly fine-grained rocks of a pale yellowish or sometimes white colour. The diamond-bearing ground is found in what are called "pipes." They are the vent-holes of extinct volcanoes, and vary very greatly in size. Their depths are unfathomed. The Kaalfontein pipe is about 290 feet in diameter, while that of the Premier Mine is an irregular oval about one-third of a mile broad by half a mile long. The latter has been probed to a depth of over 1,000 feet, and the diamond-bearing matter is found all the way down. The ground passed through is much the same in all the boreholes of the Premier Mine—a foot or so of surface soil; then three or four feet of "Red" ground, frequently mixed with sand, gravel and boulders; several feet more of "Yellow" ground, and then the famous "Blue" ground which is generally looked for in diamond workings.

The accompanying photograph of the present workings will help the reader to understand the work that has been done so far. A huge hole has been dug 350,000 square yards in surface extent. The top soil has been carted away and treated, with the result that diamonds to the extent of more than a million carats have already been found, and there are hundreds of thousands of loads of sorted soil waiting in great heaps for further treatment. The plan of working is to take out all the diamondiferous earth and rocks so far as it goes. The limit is called the "wall" of the pipe. The first excavation was about twenty feet deep, tested over the whole surface of the claims area. When that section was all taken out a lower section of another twenty feet was excavated. Our photograph shows the beginning of the third section. A trench about thirty feet deep has been dug out, and this will be enlarged in every direction until the excavators reach the quartzite wall of the pipe. In some diamond pipes diamondiferous ground is hard, but that of the Premier pipe is soft and easily pulverised. On the south-west side of the Premier workings the wall of the pipe is almost vertical, and it is

bewildering to think of the buried treasure in a hole one and-a-half miles in circumference, by an ascertained depth of a quarter of a mile. The diamonds found in the Premier pipe are of all sizes, shades and values, but unaccompanied by any great quantity of other precious stones. The average value per carat is 27/-, and the average yield is one carat per load of earth. It costs 3/- per load to dig and treat, and when the new machinery is in working order, by the end of 1905, the staff will be able to handle 8,000 loads



NO. 1 WORKING GEAR, PREMIER DIAMOND MINE.

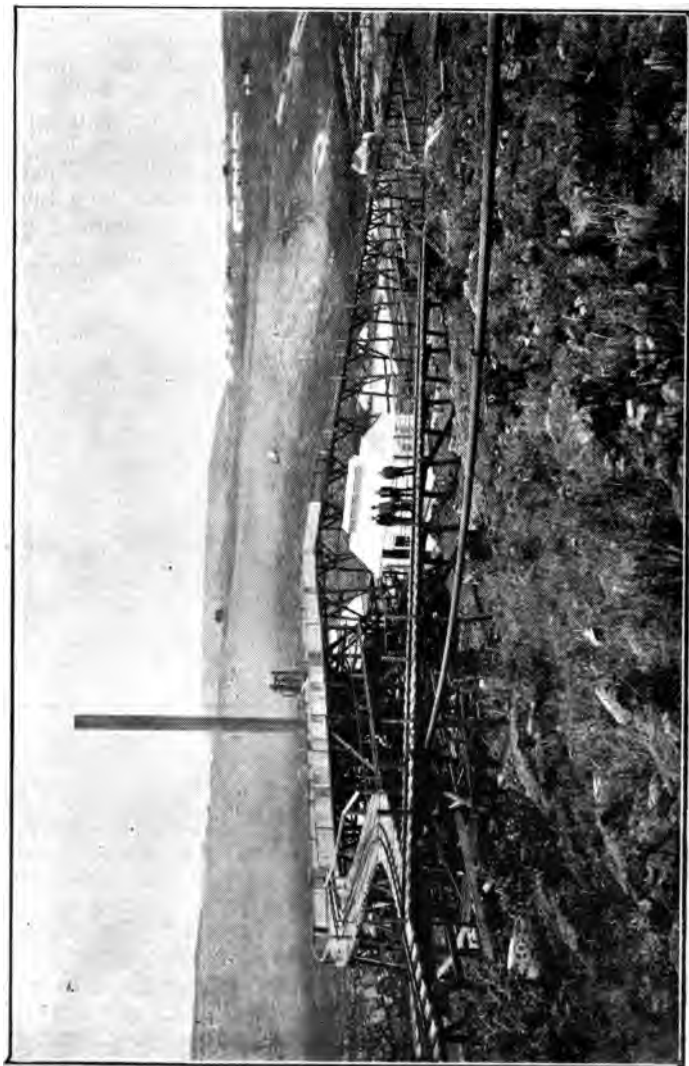
per day. That works out at a profit of nearly two millions sterling per annum, of which the Government claims 60 per cent. The profits accruing to the Government in 1905 amount to £550,000. So large an output means much mechanical engineering work, several thousand native labourers and a large managerial staff. The extensive *machinery* is mostly of British manufacture and of modern *construction*. Visitors will doubtless pay particular atten-

tion to that which has been lately imported, but we may briefly describe the various processes, which are for the most part automatic. First of all, the trucks that have been filled with about 16 cubic feet of igneous soil are hauled to the bridge of the headgear by a stout capstan and wire rope, tilting their contents as they pass into large gratings, through which the stuff passes into fan feeders that conduct it to the crushing rollers. From the rollers the crushed soil falls on to feed elevators, which distribute it to



PICCANNINIES SORTING OUT DIAMONDS.

the washing pans. These pans are placed one above another. All the stuff goes into the upper pans first. The heavy diamondiferous particles sink to the bottom, and the lighter particles pass away with the water in the lower pans and so on. The "concentrates" are removed in locked trucks to the "pulsators," which automatically sort out the diamond particles. The haulage tracks and water supply pipes are shown on the next page. There is indeed a considerable



WASHING GEAR AT THE PREMIER MINE.



amount of hand sorting done with much skill by little black boys in the open air, but the more important sorting is done by white men in a well lighted room. Sometimes diamonds present themselves in the open workings, especially if they are of unusual size; and there is a rule of the Company that a percentage of the value of each diamond so found shall be paid to the finder, if he brings it at once to the foreman of his gang. The famous "Cullinan" diamond was discovered that way, and was dug out with a penknife. The result to the finder was £2,000. The generosity of the Premier Company to its servants is well known, and no difficulty is experienced in getting all the labour that is required.

It may be of interest to mention that the diamonds when found are very rough and dirty, in fact they look very unlike diamonds. Their first journey is to Johannesburg, where they are cleaned. Then they go to Messrs. Neumann, well-known diamond merchants in London, which is their recognised market. The transportation of the Cullinan diamond, worth over half a million of money, was a responsibility that few cared to risk, so the management wrapped it up as a simple parcel and sent it by post!

A large volume of water is required for the washing processes of a diamond mine; and that is the chief obstacle that the Premier managers have to contend with. They have purchased large tracts of land adjoining their original farm, whence they can draw water to collect into dams. One large dam near the mine will hold 250,000,000 gallons of water. Once the water is in the dam it is an easy matter to conduct it to the washing gear; but the getting of the water is the great difficulty.

Visitors will be struck with the completeness of the arrangements about the Premier Mine for the comfort of the workers. There are no shops, only one large store conducted by someone in whom the directors have confidence. This position of things is sometimes designated as a monopoly, but the object of the management was to lessen facilities for illicit diamond trading. The directors safeguard the interests of employees by limiting the storekeeper's profit to a given percentage on the actual wholesale cost of the goods.

One large building serves for the combined purposes of School, Town Hall and Theatre. About a hundred children attend the day school. Presbyterian services are regularly held by a resident minister, and Anglicans are proposing to build a church. The present football fields are probably the most valuable in the world, for they occupy part of the surface of the diamond pipe. All the world is interested in the Premier Mine just now because of the great Cullinan diamond, although very few people could make use of it.

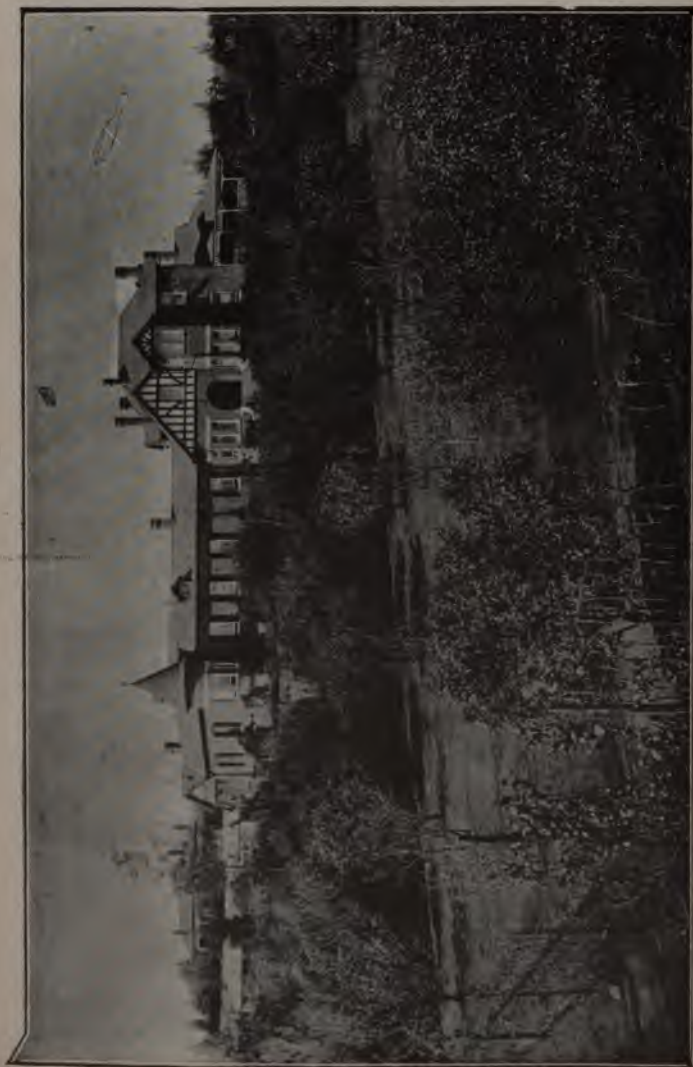


LOCAL SECRETARY'S OFFICES, PREMIER DIAMOND MINE.

Other large stones are constantly being found of from 20 to 50 or 100 carats in size, and in June, 1905, one was picked up of  $489\frac{1}{2}$  carats. Several fine stones between 200 and 400 carats in weight have been found, and it is expected that many large stones of from 10 to 20 carats will be revealed in the huge heaps of large granules that have been exposed to the crumbling action of the sun and air. *The treasures of the Premier are inexhaustible. C.A.L.*



ACTUAL SIZE OF THE GREAT "CULLINAN;" DIAMOND.



"SUNNYSIDE," THE JOHANNESBURG RESIDENCE OF THE HIGH COMMISSIONER.

## JOHANNESBURG

### Before and Since the War.

Of history Johannesburg has little, save what belongs to the discovery and getting of gold (which is dealt with in later sections of this handbook) and the necessary provisioning of the army of workers who are engaged in that industry. The commercial enterprise—whereby men, material, machinery, foodstuffs, clothing, domestic furniture and every modern luxury of life have been brought to it from all parts of the world—it is that which has compelled Governments to recognise the right of Johannesburg to take a place in the front rank of modern municipalities. The Colonial Office of the Transvaal, in its last report, traces clearly the rapid growth of and the efforts to meet the demand for local government. That method of administration was not understood by the Boer farmers in whom supreme power was vested prior to the discoveries of gold; and their refusal to sanction it when demanded by the chiefs of the mining and commercial community was the chief cause of Dr. Jameson's expedition. Even now local government is restricted to urban centres. Rural districts are still administered from the capital by Government officials.

The report above mentioned asserts the value to be derived from local government in the efforts that are now being made to establish friendly relations between Boers and Britons. "It is in the towns and not on the farms that the races chiefly mingle with each other. Their representatives meet at a town council table, and in their joint efforts to provide what is needed for local progress have obtained an intimate knowledge of each other which proclaims that character rather than blood is required for building up a country." This statement proclaims at once the difference between the Administrations before and since the war of 1899-1902.

In the time of Sir Owen Lanyon it was decided to establish a municipality for Pretoria; but after the retrocession that design was abandoned because the succeeding Government was averse to independent bodies having special powers for raising and spending money. Everything was then worked by the Executive of the Republic, which appointed a Landdrost (local magistrate) in each district to supervise all works that were paid for out of Government funds. The gold and diamond explorers, however, soon showed that such a plan would not work smoothly in mining camps. Most of the original prospectors on the Witwatersrand came from Kimberley, and they suggested the adoption of Kimberley methods of laying out and regulating townships. The Kimberley plan was to map the township in small leasehold plots, each sufficient for a miner's tent or shanty. Barberton was the first mining township to be so laid out, and Johannesburg followed suit very quickly. The plan has been adopted for all the townships along the Witwatersrand Main Reef.

Agricultural district townships on the other hand were laid out by the Boer settlers in freehold erven of much larger area, and while these might have gone on indefinitely without local organisation, it was not possible for mining townships to do so. A plot of ground originally intended for a miner's tent became valuable as a site for a hotel or a store when the permanency of the gold industry was assured; and the rapid influx of a large population called for immediate sanitary regulations, which the Government was asked to delegate to local administrators.

Johannesburg as a gold producing centre was discovered in the middle of 1886. It was proclaimed as a township towards the end of the same year, and in 1887 a "Sanitary Committee" was established. Similar committees were appointed in the other mining townships, and in each instance by a special resolution of the Volksraad.

But Johannesburg soon outgrew the capacity of such a system. Its inhabitants had come from well ordered European cities and they resented the discomforts experienced on the Rand. It was the absence of an efficient *local administration* which provoked some of the townsmen

to negotiate with Dr. Jameson. After his ill-fated "Raid" the Boer Republic deferred to suggestions from the London Colonial Office and established a Stadsraad (Town Council) for Johannesburg.

Half the members of the Stadsraad were required to be Burghers of the Republic. Its Chairman (Burgermeister) was nominated by the President, and its extremely limited powers were constantly reviewed by the Government. So things went on until the British occupation in 1900, when Johannesburg was placed in charge of a military officer, who worked under the direction of the Military Governor. May 1901, saw the commencement of European methods of local administration on the Rand; for a Town Council of twelve nominated members was appointed, under the presidency of Major O'Meara. This was very little more than the old Stadsraad under another name, and it continued without change until the period of martial law expired. During that period members of the nominated Council were employed, not only in immediate administration of the town's sanitation, but also in the evolution of regulations for its future government in times of peace.\* These regulations have been the subject of much discussion and amendment, but they formed the basis on which the Legislative Council (also a nominated body) framed its Ordinances for the establishment and ordering of municipalities, and the election of Councillors to administer the same. The Government claims that in this way it has permitted the citizen to originate the present law of the Transvaal; but, as a matter of fact, all that was done in the nominated Town Council of Johannesburg was to adopt certain European methods, which had been laid before them by the legal advisers of the Colonial Administration. Such methods, the outcome of generations of experience in a city like Manchester, for instance, cannot

---

\* In 1902 a similar municipality was established in Pretoria. It remained in office until May, 1903, when its members resigned owing to differences of opinion with the Government on the subject of Town Lands. A commission of Government officials then administered the city until the popular election of a Town Council under the Municipal Elections Ordinance of 1903.





PLEIN SQUARE (THE TELEPHONE TOWER AND TEMPORARY MUNICIPAL BUILDINGS), JOHANNESBURG.



with advantage be applied to a small place like Boksburg *en bloc*, and, therefore, many village towns have been saddled with an elephantine system that is unworkable; but the system serves as a groundwork on which the councillors of large towns may try their 'prentice hands at local administration. In July 1903, the Governor's assent was obtained to four measures: the Municipal Corporations Ordinance, the Municipal Elections Ordinance, the Rating Ordinance, and (for Johannesburg only) the Expropriation Ordinance. Thus provided with the machinery for local government, the various municipalities of the Transvaal began their civic life, and the first real Town Council for Johannesburg was elected thereunder in December 1903. It consists of thirty members, one-third of whom retire annually. The Johannesburg Municipal elections of 1903 and 1904 were conducted on the general Ticket System, whereby all the voters voted for all the Councillors, many of whom could only be personally known to a fraction of the electors. This plan was not to the mind of the citizens, who demanded the division of Johannesburg into districts, each of which should elect its own Councillors. That demand has been conceded by the Lieut.-Governor, and the 1905 elections throughout the Transvaal will, therefore, be conducted uniformly on the Ward System.

The elected Town Council of Johannesburg inherited from the nominated Council many liabilities of startling magnitude, in the shape of public works for improving the sanitation and locomotion of the city. The nominated Council had arranged a three million loan in England towards those schemes, but this being insufficient, a further loan of two-and-a-half millions was negotiated at the beginning of 1905, with the promise of another at no distant date. These loans, together with the monies borrowed on behalf of the water supply of the Rand (see page 90), involve Johannesburg in a debt of nine millions; but as that is less than the output of the gold mines in six months no one is staggered by the thought of it. C. A. L.

### Johannesburg Statistics.

The statistician of Johannesburg has contributed the following summaries:—

*Population.*—The population of Johannesburg in 1887 was about 3,000; in 1890, over 26,000; in 1896, over 102,000; and in April 1904, nearly 160,000, almost 84,000 of whom are whites.

The complete results of the 1904 census are not yet available, so that we are compelled to fall back on the 1896 tables for details. Several interesting facts relating to the white population are disclosed by these statements. There were 32,387 males and 18,520 females, or only 4 females to every 7 males. More than three-fourths of the males were over 16 years of age. The number of persons of 50 years of age and upwards formed only one-twentieth of the whole population. There were 18,200 married persons, but three-fifths of these were males. The excess of married males over married females is no doubt to a great extent due to wives remaining in Cape Colony and in Europe.

*Area.*—The area under the jurisdiction of the Town Council or “Stadsraad” before the war was just over five square miles. The nominated Town Council when first constituted in May, 1901, controlled an area of about nine square miles. This area was extended in November, 1902, to include the mines, townships, etc., within a radius of, roughly, five miles from the Market Square. The area within these new boundaries was about  $75\frac{1}{2}$  square miles, further extended in 1903 to  $81\frac{1}{2}$  square miles. One of the many new townships that have sprung into sudden and vigorous life since the war is represented on the adjoining page.

*Rateable Value.*—The rateable (capital) value of the municipal area was over £5,250,000 in 1895, of which land represented about £3,000,000; in 1897, over £19,750,000, of which about £16,000,000 was for land. The present rateable value is nearly £39,500,000, of which land represents about £27,000,000. Roughly, the debt of the city represents one-fourth of its rateable value. The rateable value is capital value, not rental. The present rate is 3d., equal to a 4s. rate in England, where the rate is according to rent.



THE EXTENSION OF JOHANNESBURG.—A SUBURBAN TOWNSHIP.

### Vital Statistics.

*Births.*—During the year July 1, 1903 to June 30, 1904, 2,431 white births were registered, equal to a birth rate of 28·9 per 1,000. During the same period 451 coloured births were registered. In calculating the proportion of coloured births, it should be remembered that thousands of mine labourers have left their wives at home.

*Deaths.*—From July 1, 1903, to June 30, 1904, the total number of white deaths registered was 1,539, equal to a death rate from all causes of 18·3 per 1,000 per annum. Deducting 93 non-residents, the death rate was 17·2 per thousand.

Dysentery and diarrhoea were responsible for 313 deaths (of which 207 were children under one year of age), pneumonia 171, enteric 126, tuberculosis of lungs 82, and miner's phthisis 36.

The infantile mortality (*i.e.* of infants under one year) was 185 per 1,000 births.

The number of coloured deaths registered during the same period was 2,404, equal to a death rate of 32·9 per 1,000 persons living. Pneumonia was by far the most fatal malady, causing 762 deaths. Dysentery and diarrhoea were responsible for 316 deaths, of which 90 were amongst infants under one year old. Tuberculosis of the lungs is credited with 195 deaths, enteric or typhoid with 104 deaths, and scurvy with 74 deaths.

*Marriages.*—From July 1, 1903, to June 30, 1904, the number of white marriages registered was 1,193, equal to a marriage rate of 28·4 per thousand.

During the same period 105 coloured marriages were registered. Here again the few native women on the Rand must be taken into account. When a Kaffir has earned enough money by mine labour he goes home to be married.

Before any marriage ceremony can take place in a place of worship in the Transvaal the parties enter into a civil contract before a magistrate, whose duty it is to tell them that they are legally married thereby without any other service or ceremony! For this procedure the Government receives a fee of £3 from each white couple.

*Poor Relief.*—Happily, there are no workhouses in Johannesburg at present. The only duty in connection with poor relief imposed on the Municipality is that of providing for the burial of destitute persons dying within the limits of the Municipality. The Town Council, however, contribute £600 per annum towards the Home maintained by the Rand Aid Association; £300 per annum towards the Men's Night Shelter, the Men's Social Farm, and the Rescue Home for Women, maintained by the Salvation Army;



THE NAZARETH HOME, YEOVILLE, JOHANNESBURG.

£300 per annum towards the support of the Johannesburg Branch of the Nazareth House; £200 per annum to the Children's Undenominational Home; and £75 for the current half-year to the maintenance of the Home for Homeless Women and Children, established by the Benevolent Sub-Committee of the Guild of Loyal Women; £100 for the current half-year to the Anglican Orphanage, Turffontein; and £150 for the current half-year to the Dutch Orphanage, Langlaagte.

*Municipal Finance.*—The revenue for the year 1904-5 was originally estimated at £761,283, made up as follows:—

	£
Licences, Fees, etc. ...	76,385
Charges for Sanitary Service ...	150,400
Expropriated Area Rents ...	25,000
Light and Power Department Profit ...	36,543
Tramways Profit ...	19,753
Miscellaneous and Extraordinary ...	38,200
Brought forward from previous year ...	80,844
Assessment Rate (2d. in £) ...	334,158

The ordinary expenditure was estimated at £745,525, composed of:—

	£
Interest and Redemption Charges ...	183,250
Expropriated Area Administration ...	15,165
Street Lighting ...	23,469
Night Soil Removal ...	131,374
Refuse ...	50,673
Slop and Bath-water ...	91,757
Street Scavenging ...	22,415
Rand Plague Committee ...	22,000
Maintenance of Streets, &c. ...	76,900
Administration—Various Departments	128,522

*Town Improvement Schemes.*—The Town Council have expropriated an area of about 173 acres, a large portion of which was in an insanitary condition, laid out on no regular plan, and without sufficient means for through communication for the large traffic going westwards from the centre of the town.

Bree Street and Jeppe Street, two of the principal thoroughfares, will be continued through the area, which will be properly drained and laid out in larger blocks than those in most of the remainder of the business portion of the town.

Dwellings to accommodate persons of the working class displaced have already been erected.

*Sanitation.*—The “Bucket system” is employed for the removal of nightsoil. Slop water and bath water are collected by means of tanks, deposited at intake stations, and thence either led by gravitation or pumped to depositing sites.

The present system is both very costly and very unsatisfactory, and its defects are aggravated by the unavoidable employment of native labour.

The Town Council has decided upon a water-borne sewerage scheme, and it is expected that the south-western portion of the town, which is estimated to contain about half the total population, will be sewered by the end of 1905. Plans for the south-eastern and eastern portions of the scheme are in course of preparation.

Refuse is dealt with partly by means of two refuse destructors and partly by disposal on depositing sites.

*Lighting.*—The electric and gas undertakings are owned and worked by the Municipality, having been acquired from the Johannesburg Lighting Company in 1895.

The gas undertaking is a small one, and the mains are laid in very few streets. The number of cubic feet of gas made is about the same as in the small town of Berwick-on-Tweed.

The electric light undertaking, although considerably extended since it was acquired by the town, is inadequate to meet the public demands, and about two-thirds of the current supplied is purchased by the Council as a temporary expedient.

A generating station and system of distribution adequate to meet all immediate demands are being provided by the Council under the comprehensive scheme for electric light and power, now being carried out.

*Fire Brigade.*—The Municipality possesses a well-equipped Fire Brigade. The central station is a temporary one and is situated on the north-west corner of Von Brandis Square.

A Fire Station for the Eastern District has been erected at Jeppestown.

*Market.*—The market is owned and controlled by the Johannesburg Market Concession and Building Company, Limited, under a concession granted in 1889 by the Government of the late South African Republic.

The average prices paid at auction in Johannesburg for forage and foodstuffs in bulk during June 1905, were :—



PART OF THE MARKET SQUARE, JOHANNESBURG.

		s.	d.		s.	d.
Barley, per bag of 160 lbs. net	-	14	6	to	14	9
Chaff, per bale, 100 lbs. net	-	5	3	to	5	9
Eggs, per dozen, new laid	-	3	0	to	3	6
Forage, per 100 lbs.	-	5	6	to	5	9
Fowls, each	-	2	3	to	4	0
Mealies, per bag 200 lbs. net	-	10	6	to	11	3
Onions, per bag of 125 lbs. net	-	13	6	to	15	6
Pigs, per lb. live weight	-	0	4	to	0	4½
Potatoes, per bag of 160 lbs. net, large	-	12	6	to	25	0
Rye, per bag of 200 lbs. net	-	14	0	to	14	6
Salt, per bag of 200 lbs net	-	6	6	to	6	9
Seed oats, per bag of 130 lbs. net	-	14	3	to	14	9
Turkey cocks, each	-	8	6	to	14	3
Tobacco, cut, per lb.	-	0	3	to	0	4½
Wheat, per bag of 200 lbs. net	-	18	6	to	23	6



**Tramways.**—The tramways were taken over by the Municipality by agreement with the Johannesburg City and Suburban Tramway Co., Ltd., on June 30, 1904. The Company owned and worked the tramways under a concession granted by the authority of the State President and the State Secretary of the late South African Republic in April 1889, to Mr. Sigmund Neumann, and ceded to the Company in September, 1889.

The tramway system, at present limited to  $11\frac{1}{2}$  miles of route and employing only horse-power, has long since proved inadequate to the requirements of the town, as it covers practically only the portion of the Municipality between the railway and the mines. The Town Council is, therefore, providing electric tramways on an extensive scale, and it is expected that the electric cars will be running on some routes before the end of 1905.

**Rates of Wages and Hours of Labour.**—The following statement shows the rate of wages and hours of labour in some of the principal trades in June, 1905, according to a statement supplied by the Witwatersrand Trades and Labour Council :—

Trade.		Rates of wages.	Hours of Labour.
Bakers	...	90s. per week	60 per week
Boilermakers	...	20s. per day	48 per week
Bookbinders	...	115s. per week	48 per week
Bricklayers	...	22s. 6d. per day	8 per day
Carpenters	...	2s. 6d. per hour	48 per week
Compositors	...	115s. per week	48 per week
Engineers—Mines	...	120s. per week	—
Engineers—Railway	...	2s. 6d. per hour	48 per week
Iron Founders	...	120s. per week	51 per week
Lino Operators	...	140s. per week	45 per week
Machine Minders	...	115s. per week	48 per week
Miners	...	25s. per day	10 per day
Painters	...	18s. per day	70 per week
Plasterers	...	22s. 6d. per day	48 per week
Plumbers	...	20s. per day	50 per week
Stonemasons	...	3s. per hour	48 per week
			E. S. C.

### Imports and Exports.

783,413 tons of goods were received at Transvaal stations from the Cape, Natal and Delagoa Railways during 1904. Of these 357,079 tons were for Johannesburg and 198,631 tons for other stations on the Rand, leaving 227,703 tons for the rest of the Transvaal.

The value of goods imported into the Transvaal during the year 1904 was:—

		£
Metals, Machinery, &c.	... ..	2,933,474
Textiles and Clothing	... ..	2,310,068
Foodstuffs and Drink	... ..	3,633,849
Miscellaneous	... ..	4,749,986
Total		<u>£13,627,377</u>

Some of the larger items were:—

		£
Hardware	... ..	676,038
Mining Machinery	... ..	718,832
Apparel and Slops	... ..	640,412
Boots and Shoes	... ..	382,015
Haberdashery and Millinery	... ..	844,814
Butter	... ..	201,412
Flour and Meal (wheaten)...	... ..	376,038
Meats	... ..	1,015,837
Spirits	... ..	250,217
Sugar	... ..	334,395
Chemicals and Toilet Articles	... ..	277,294
Books, Stationery and Paper	... ..	277,191
Corn and Grain (other than wheaten flour and meal)	... ..	680,174
Dynamite and other Explosives	... ..	247,785
Furniture, Carpets, &c.	... ..	345,456
Tobacco and Tobacconist's Ware	... ..	224,295
Wood (manufactured and unmanufactured)	... ..	527,632

The exports for the same period amounted to £17,770,988

The chief exports were—Gold, £16,054,809; Diamonds. £901,745; and Coal, £143,630. S. E. C.

### Railway Station Courtesies.

The world-wide reputation which Johannesburg has attained, not only by means of its gold output but also by reason of its response to opportunity, has rendered it an object lesson for people with means and leisure from every land. The citizens have therefore abundant occasion for manifesting good feeling, and Park Station is almost daily the scene of vociferous welcomes and good-byes. The accompanying illustration represents the interest



WELCOME TO JOHANNESBURG.

recently taken in the visit paid by an American admiral who had anchored his fleet in Table Bay and paid a flying visit to the Transvaal. Still larger crowds witnessed the departure of one High Commissioner and the arrival of another during the year 1905. Smaller crowds but very hearty ones "send off" old friends and popular favourites by the Coast trains every Sunday night and by the *European train-de-luxe* on Monday afternoons on their way to catch the mail steamers.



OFFICES OF THE TRANSVAAL LEADER.

### Newspapers of Johannesburg.

From the last paragraph it will be seen that Johannesburgers take keen interest in international affairs. The newspapers help them to do so. The proportion of cable news in Johannesburg daily papers is not less than in those of London. Four journals compete for the favour of Johannesburg, viz.: THE TRANSVAAL LEADER, THE RAND DAILY MAIL, THE STAR and THE DAILY EXPRESS.

Very few newspapers in the Transvaal are self-supporting; most of them are obliged to seek special assistance beyond what is received from advertisements and sales. Owing to this position patrons of the papers are able to offer sufficient remuneration to attract journalists of merit. THE STAR of Johannesburg is the property of the Argus Company of South Africa; and THE LEADER is owned by the CAPE TIMES, Limited. The RAND DAILY MAIL has changed its proprietors twice during the year 1905; and the DAILY EXPRESS is quite a new paper, dating from the first Monday of July, 1905. THE LEADER and THE STAR each publish an illustrated weekly summary. Post Office sorters are kept very busy on Saturdays and Mondays owing to the numbers of those weeklies which are mailed to England.

Other weeklies published in Johannesburg are the TRANSVAAL CRITIC, the SOUTH AFRICAN MINING JOURNAL, and the TRANSVAAL REVIEW. There are several weeklies and monthlies representing the interests of particular commercial or religious organisations.

Pretoria has three daily papers, two English and one Dutch, viz.: the TRANSVAAL ADVERTISER, the PRETORIA NEWS and the VOLKSTEM. LAND EN VOLK and DE TRANSVALER are Dutch weeklies.

Many of the country towns have weekly papers. Among the more prominent are the GOLDFIELDS NEWS (Barberton), the EAST RAND EXPRESS (Germiston), the POTCHEFSTROOM BUDGET, the EASTERN TRANSVAAL TIMES (Standerton), the LYDENBURG NEWS, the ZOUTPANSBERG REVIEW, the VOLKSRUST RECORDER, the KLERKSDORP RECORD, and the HEIDELBERG NEWS.

### The Stock Exchange.

One of the most notable institutions connected with Johannesburg is the Stock Exchange. Its original locale used to be on the north side of Commissioner Street, between Simmonds and Fraser Streets, in the building now known as the Old Exchange, but the Exchange had no corporate existence before 1897. Until that year its status partook of the somewhat unsatisfactory nature of a private venture of the Johannesburg Estate Company, much in the same way as other private exchanges are doing business in the city still, only on a larger scale. When the brokers became numerous and wealthy, they obtained a charter of incorporation and purchased the site of the new Stock Exchange. When the war was over, steps were taken to provide a suitable edifice with a result that is admirable, at a cost of £160,000.

The structure occupies a whole block between Fox, Holland, Main and Sauer Streets. It is built in the style with which Inigo Jones and Christopher Wren commenced to ornament Whitehall, a style that is well adapted to official buildings. There are three floors of offices and a basement, three electric lifts and five staircases. The Exchange Hall is in the centre, and lighted from the roof. The offices, 210 in number, are built all round the hall on each floor. There is a large strong room for members only, containing 294 safes of varying size. Under the Exchange Hall are Reading, Writing and Billiard Rooms for the use of members. The excavations for the building began in August, 1902, the foundation was laid by Lord Milner on April 6, 1903, and the premises were occupied in December of that year. The material is Transvaal stone. The hall is divided by two rows of marble pillars into a nave and aisles.

Much might be written about the importance of the Stock Exchange transactions on mining speculations. Some gold-mining companies, for instance, have not put a spade into the ground. They are created for the purpose of raising capital with which to speculate in the shares of gold-mining *companies that do work*, Naturally, the shareholders have

.

no objection to this course, so long as good dividends are paid; but it hardly seems legitimate business to the outside world.

In June 1905, there were 214 different stocks quoted on the official list of the Exchange. These represented a total of over one hundred millions sterling. The stocks are not only gold-mine shares, but include coal-mines, land, diamond mines, financial corporations, municipal and water loans, and exploration syndicate shares.

Before the war, the entrance fee for those who were



THE STOCK EXCHANGE, JOHANNESBURG.

allowed to become members of the Stock Exchange was 100 guineas. It is now 500 guineas. Members pay in addition three guineas per quarter. There were about 500 members at the end of June 1905, of whom nearly 400 were proprietary members.

The Stock Exchange business, like all other businesses in Johannesburg, begins at 9 a.m., and sometimes the transactions completed are numerically enormous. At other times the members have very little to do. The Stock Exchange is the barometer of South African prosperity.

### Principal Streets.

It is not a purpose of this book to make detailed references to particular houses of business. That would be a lengthy and an invidious task. It must suffice to name the principal streets and let visitors judge for themselves the merits of individual stores. Visitors to London, shopping bent, gravitate to Oxford Street or Tottenham Court Road, according to their needs, although they could probably get similar goods at the same price nearer home. It is the



PERMANENT BUILDINGS, HARRISON STREET, JOHANNESBURG.

same with Johannesburg. If a wedding trousseau is wanted by a farmer's daughter, she wanders to Johannesburg to get it; and the specific shopping districts are as well classified and as well known as they are in any other great city. There is a hay-market and a cattle-market, but at different ends of the same great Market Square, and the two departments are never allowed to clash. The less said about the Market buildings the better. Visitors will be *amused by the auctioneer cheapjacks in Market Square.*



Oxford Street has its counterpart in Pritchard Street ; but Eloff Street, which crosses Pritchard Street at right angles, caters for an entirely different class of customers, just as Bond Street in London has its peculiar *clientele*. Pritchard Street on a Saturday night, between Rissik Street and Von Brandis Square, is one of the sights of the city. Vehicular traffic is stopped, and pedestrians throng the roadway in the blaze of countless electric lights, not so much for the purpose of shopping as to look for old acquaintances, and talk over what has happened since the previous Saturday.

Commissioner Street is the Strand, and it extends due east and west for miles. It is emphatically a man's street. Women will find very little in it to satisfy their shopping propensities. In the day-time it is given over to "professional" work. The gold-mining companies have their offices there or thereabouts ; agents, solicitors and architects abound ; restaurants and bars bespeak their hasty meals and the drinks with which each "deal" is cemented. Loafers throng each corner to the great inconvenience of people who have business to transact. Most of the theatres and the largest hotels are in Commissioner Street. At present horse-drawn tram-cars traverse the busiest part of Commissioner Street, but the electrically-propelled cars will run along Market and Main Streets, and so bring the latter into greater prominence than they at present enjoy.

As far as possible the main streets of Johannesburg are laid out east and west, with cross streets running north and south ; but this arrangement is not absolute, owing to the original boundaries of different estates on which the town is built. Where the original township was limited, for instance, by a diagonal line dividing two properties, that acute division is still traceable in the termination of the streets. On the whole, however, the city is well laid out and most of the streets are sufficiently wide.

Two cross streets connecting Commissioner and Market Streets are noticeable as having been closed to vehicular traffic for a long while by means of posts and chains. — They are called Simmonds Street and Fraser Street. One of them was closed several years ago to



THE "CORNER HOUSE," COMMISSIONER STREET, JOHANNESBURG.

enable share brokers to do their business in the open air, the Stock Exchange being then on the west side of Simmonds Street. Since the new Stock Exchange was built that street has been re-opened for wheeled traffic. Fraser Street was subsequently blocked to give similar facilities to auctioneers ; and its chains are still in evidence. "The Chains" of Johannesburg are as world renowned as Capel Court or Wall Street.

The principal structure in Johannesburg is undoubtedly "the Corner House," at the corner of Simmonds and Commissioner Streets, the official headquarters of the greatest group of gold mine companies. It belongs to the firm of Eckstein & Co.. Adjoining it northwards and in so identical a style that the two buildings seem to be one, is the chief office of the National Bank. S. E. and within a stone's throw is the new block built by Barnato Brothers at the junction of Fox and Harrison Streets. A fine view of Johannesburg and its surroundings is obtainable from the roof of either of these buildings.

Several of the commercial firms have erected stately structures quite as lofty as the mine offices named, and the older business places suffice by comparison. For many years to come the symmetry of the town will be impaired by these irregularities. It is to be regretted that there was not an efficient building committee in existence to control the size and type of offices, shops and houses. The architects practising in the city have thought a good deal about their drawings as they look on paper, but nothing at all about the environment of the finished buildings. Consequently the tall and the dwarf are jumbled inartistically together, and the city is made a thing of shreds and patches. Regent's Street in London does not suffer commercially where its shops are of uniform architecture. Nor is Johannesburg any the better off by having elephantine and pigmy buildings side by side. This is one of the problems its Town Council will have to solve when sewage and lighting schemes are out of the way. For their own credit's sake the local Society of Architects and the Municipal Surveyor should give the matter serious consideration.

The Boer Government proclaimed Johannesburg to be

a township on September 20, 1886. On December 8 of that year the first block of stands was sold by auction, and the prices realised varied from a few shillings to £200. Subsequent sales were held and the total amount realised by the sale of all the land in the original city was about £50,000. A comparison of this fact with the present price of land in the centre of the town is more than instructive.

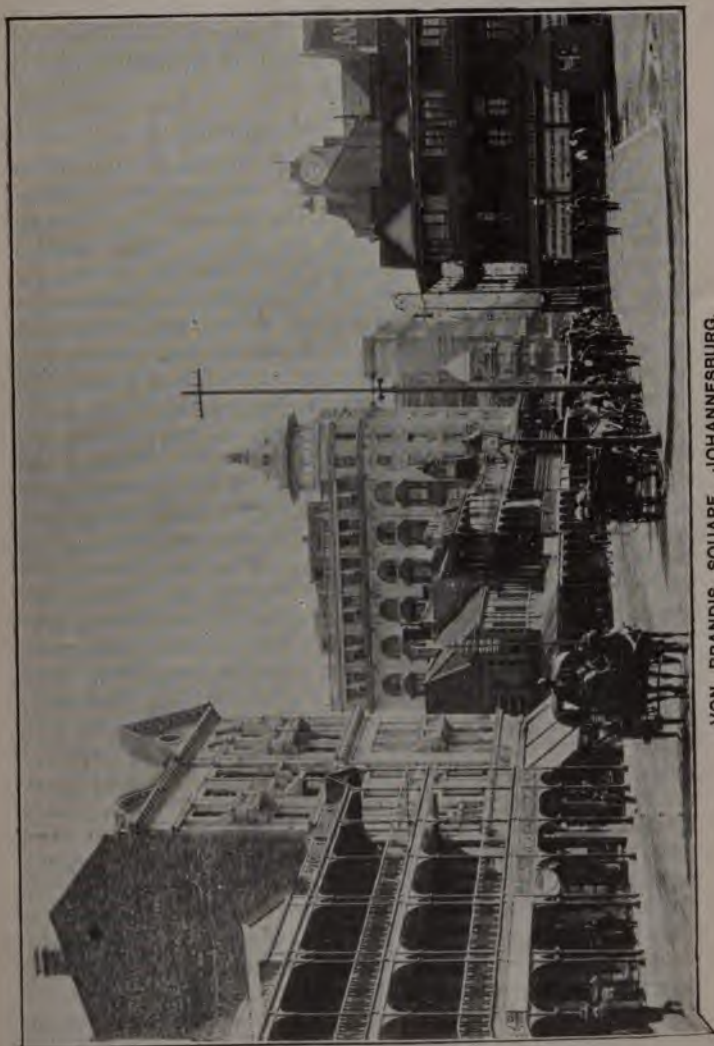
---

### Public Buildings.

Besides the Post Office (page 76), there are no public buildings in Johannesburg worth mentioning, the late Republic having established its administrative offices in Pretoria before there was any idea of the development of Johannesburg to its present extensive proportions. The Law and Police Courts (page 96A) are inadequately housed on "Government Square," between Rissik and Eloff and south of Fox Street. When the original courts became too small other rooms were rented in Caledonian Buildings near by, and these are now Government property. Better accommodation and a larger staff of judges, magistrates, and clerks are urgently needed.

The Municipal Buildings on Plein Square are purposely of a temporary character, in hope that a Town Hall may spring up before long on the Market Square, facing the Post Office. The Post Office itself had an additional storey built on to it in 1904, but it is still far too small.

When the military occupied Johannesburg in 1900 there were many blocks of offices at disposal. Some of the best, such as the Castle block in Eloff Street, the Corporation Buildings in Rissik Street, Winchester House in Loveday Street, and Henwood's Arcade in the Market Square, were taken over for the martial law administration, and these have continued in Government occupation at a high rental ever since; except that the building of new railway offices opposite Park Station has recently set the upper floors of Henwood's Arcade at liberty for commercial purposes. A controversy is going on between the *Government and the Municipality* as to where Government offices



VON BRANDIS SQUARE, JOHANNESBURG.

should be built, the opinion of citizens being that the Market Square site should be reserved for Municipal Buildings, and that the Government Departments should be housed in Von Brandis Square.

### The Suburbs of Johannesburg.

Visitors to Johannesburg should take excursions to various points of vantage, such as Fairview, the Observatory, Hillbrow, and the roof of the "Corner House" in order to survey the surrounding townships. They may be reminded of days when the Church of Trafalgar Square, for instance, was literally 'St. Martin's in the fields,' between the cities of London and Westminster. It has taken over 200 years to fill up those fields with offices and houses, but there were hardly a score of houses to be found within the present municipal boundaries of Johannesburg in 1885. To-day there are scores of thousands. Some of them are palaces, the majority of them are comfortable, and the dilapidated ones are only so because of the caution exercised by Pioneers of the Rand when its treasures were first revealed. As each pioneer made a little money he discarded his tent for a wood and iron shanty. When he made a little more he built a small cottage on the veld just outside the proclaimed diggings. When his funds increased still further he built a villa "in the country," and as he grew in wealth so his domestic requirements expanded. His shanty became a store, his cottage sheltered his workmen, his villa was rented to his clerk or to the lady who lets lodgings, and what used to be "the country" is now the inner circumference of the original township itself surrounded by ever widening circles of houses, shops, villas, homesteads and all the institutions needful to the life of a great city. Johannesburg and five miles round roughly represents the municipality. Counting Johannesburg as the area within a radius of one mile from the General Post Office—all beyond are the suburbs, which vary in density of population according to the distance from town, or according to the energy and worldly wisdom expended in booming the "residential estates" into which the outlying *districts have been planned*. In the "early days" of the

Rand miners and tradesmen speculated in shares. They are wiser now, and prefer to invest in something that cannot run very far away. The working men who own a plot of land and a house are in greater proportion in Johannesburg than in England; and they can generally realise with advantage when they want to go back to the Old Country. The wealthier suburbs are Parktown, Berea, Belgravia, and Doornfontein; the poorer districts are Fordsburg, Braamfontein and Jeppes. Vrededorp is



DOORNFONTEIN, FROM HOSPITAL HILL RIDGE.

almost exclusively occupied by poor Dutch. Civil servants are migrating to Richmond and Melville. The enormous number of cyclists careering in all directions from the city from one o'clock in the day up to a quarter past that hour proclaims the number of clerks, both male and female who live near enough to go home to lunch; and the still larger number of cyclists who throng the street from 5 to 5.30 p.m. is a sure guide to the popularity of the suburbs for those whose means are slender. The number of motorists

who precede them by half-an-hour is an equally safe indication of the directions in which successful commercial and professional men prefer to dwell. Visitors should explore the suburbs for themselves. Until they have done so they have not seen Johannesburg.

---

### Country Drives.

For lack of convenient seaside resorts Johannesburgers who need fresher air than the dust-laden city affords seek it in occasional excursions to outlying hamlets, either within or without the Municipal boundaries. A very popular drive is through Parktown and the forest known as the Sachsenwald, which the Braamfontein Estate Company planted about 1888, to Craighall Park, where there is a convenient hostelry for entertainment of man and beast: returning by the more easterly route to Johannesburg through Norwood township and Orange Grove. Roadways are now being made through the Sachsenwald in all directions, prior to leasing the estate for residential purposes; but a portion of the wood has been presented to the town to be known as 'Eckstein's Park,' and here will be found the small nucleus of what may grow into an important zoological collection.

On bank holidays, and on Wednesday and Saturday afternoons, picnics to the lakes and waterfalls of the Rand [notably, Boksburg (page 98), Florida (page 154), and Rosherville (page 96B), are organised for the recreation of city workers and their families. There are no excursion vans, such as school-children and beanfeasters delight in at Home, but luggage trolleys drawn by half-a-dozen mules serve the purpose very well, especially when a mattress is laid on the floor of the waggon to sit upon, and the merry-makers' feet dangle over the sides. School-children enjoy this immensely, and so apparently do children of larger growth. For those who prefer a speedier method of transport there are convenient trains to the "lakes." Cleveland is the station for Rosherville. Florida and Boksburg have *stations close at hand.*



### Remarkable Building Activity.

The best way of arriving at a just idea of the rapid development of Johannesburg Municipality is by an analysis of the work done in the office of the city's Building Surveyor. During the six months ending June 30, 1905, the number of building plans submitted to, and approved by, that department were as follows:—January, 604; February, 693; March, 924; April, 632; May, 734; June, 613—total, 4,200. The plans are for all sorts of buildings,



SUBURBAN JOHANNESBURG (TROYEVILLE AND BERTRAMS).

great and small, but most of them are for new dwelling-houses and shops, or additions to existing houses and shops. These approved plans represent the building work that is now going on in every direction. In the rainy months of the year there is naturally less building done.

The Municipality, for the purpose of this analysis, is arbitrarily divided into four circles; the city within a mile of Market Square; the inner circle from a mile to two miles from Market Square; the middle circle from two to three miles from Market Square; and the large outer circle thence to the extreme boundaries of the Municipality

Details of the number of plans passed for each township follow, in order to explain where work is being done.

*The Hub.*—Argyll 2, Braamfontein 65, Burgersdorp 68, City and Suburban 61, Ferreira 132, Hospital Hill 10, Johannesburg 422, Marshall's Town 161, Marshall's Extension 11, Newtown 5, Wanderers' View 46—total, 983.

*The Inner Circle.*—Berea 50, Bertrams 58, Braamfontein Werf 16, Doornfontein 62, Fairview 106, Fordsburg 79, Highlands 1, Hillbrow 98, Jeppes 85, Lake View 30, Lorentzville 36, Mayfair 10, New Doornfontein 119, Ophirton 51, Parktown 88, Parktown West 15, Prospect 4, Spes Bona 6, Springfield 43, Troyeville 126, Vrededorp 144, Wolhuter 13, Yeoville 105—total 1345.

*The Middle Circle.*—Auckland Park 3, Belgravia 9, Bellevue 99, Bellevue East 100, Bezuidenhout Valley 150, Booyens 14, Booyens Reserve 33, Brixton 42, Heronmere 16, Houghton Estate 1, Jeppes Extension 122, Judith's Paarl 46, Kensington 43, Klipriviersberg 17, La Rochelle 61, Melville 60, Observatory 24, Regents Park 66, Richmond 37, Sunnyside 12, Turffontein 214—total, 1169.

*The Outer Circle.*—Abbotsford 7, Albertville 5, Braamfontein Farm 3, Bramley 9, Claremont 7, Cleveland 10, Cyferfontein 2, Denver 52, Doornfontein Farm 6, East Town 1, Emmarentia 2, Forest Hill 31, Gardens 9, Highlands North 4, Klipfontein 5, Langlaagte 9, Linden 6, Martindale 8, Melrose 23, Mountain View 4, Newlands 58, Norwood 80, Oaklands 14, Orange Grove 29, Orchards 40, Parkhurst 5, Parktown North 27, Rosebank 12, Rosettenville 61, Rosettenville Extension 12, Rouxville 6, Sophia Town 45, Victoria 8, Waterval Farm 5, Waverley 9, West Turffontein 10—total 613. 89 other plans were passed for buildings on the mines not included in these townships.

### The Wanderers' and Sport.

The magnificent recreation ground belonging to the Wanderers' Club is situated immediately to the north of Park Station, and covers an area of thirty acres. Here are the headquarters of athletics for Johannesburg and the Transvaal in general. Four separate grounds are available

for cricket, football, hockey, lacrosse and baseball, while the eastern portion is marked off into ten lawn-tennis courts. In the centre of the ground are two halls, forming the most popular assembly rooms in the town.

The Wanderers' Club, which now comprises a membership of over a thousand, sprang from small beginnings. A football club and a Wanderers' cricket club made use of the site before it was formally leased in 1888 by the late



WATCHING A FOOTBALL MATCH ON THE WANDERERS' GROUND.

Government to a reconstituted Wanderers' Club at a rental of £50 a year. On this club, which received the financial support of the leading inhabitants of Johannesburg devolved the task of fencing and laying out the ground, on which a sum of £35,000 in all has been expended. During the season of 1888-9 the first English cricket team to visit the Transvaal played two matches at the Wanderers'. Visits have since been received from three other Home cricket teams, from the Australians, and from English Rugby and Association football teams.

It is, however, not only in the realm of sport that the Wanderers' has become a household word in South Africa. In the large hall, which in normal times does duty for a gymnasium or a skating rink, have been held the majority of the public meetings that have formed so prominent a feature in the political activity of the Rand. Here President Kruger met the Uitlander community on his memorable visit to Johannesburg in 1890. Nine years later the great meeting of the South African League that was forcibly broken up by the authorities took place within its walls; while in more recent times less momentous questions have not failed to pack the hall with the Johannesburg public. The new hall, built since the war to replace the wood and iron structure that was burned to the ground in 1898, does duty for balls, concerts, etc.

H. T. M. B.

---

### The Turf and the Jockey Club.

Johannesburg and the Rand are well supplied with accommodation for the sport of kings. On the principal race-course at Turffontein, two miles south of the Market Square, four meetings are held annually, extending over three days each. Meetings of the Pony and Galloway Club are freely interspersed between the larger events. Besides this course there are several others over which the jurisdiction of the Jockey Club is not acknowledged.

The Jockey Club of South Africa was originally founded at Port Elizabeth. In May 1904, the headquarters were removed to Johannesburg.

The head Executive consists of nine Stewards, all of whom must reside in Johannesburg and are appointed as follows: two to represent the Transvaal, two for Natal, one for the Orange River Colony, one for the Western Province, one for the Eastern Province and one for Griqualand West and Rhodesia; the ninth Steward being elected by the members of the Club.

In addition to this there are Local Executive Stewards, with headquarters at Durban, Bloemfontein, Capetown, Port Elizabeth and Kimberley, who control all regular racing in

their respective districts, subject to a right of appeal to the Johannesburg Executive.

The membership of the Club is limited to 200.

The race-course of the Johannesburg Turf Club, which was formed in 1887 is situated  $2\frac{1}{2}$  miles from the Market Square, and is one mile seven furlongs round, with a straight run in of four furlongs.

Area of Course, 150 acres. Number of Members, 380.

The affairs of the Club are in the hands of fifteen Stewards, who are elected annually. H. T. M. B.



TURFFONTEIN RACE COURSE, JOHANNESBURG.

### Associations and Clubs.

A large proportion of residents in Johannesburg are immigrants from other lands who have been attracted by the hope of making money faster than they can make it elsewhere. In their intervals of work they seek the society of their own countrymen, and the slenderest local ties suffice to establish *camaraderie*. Thus there are Cambrian and

Canadian Societies not restricted to Welsh-born or Canadian-born members, an Association of the "Two Roses," not confined to Lancashire lads and Yorkshire men, and a Society of Cornishmen with very liberal views as to where the boundary line of nativity should be drawn. By-and-bye, when representatives of the various English counties become still more numerous on the Rand the qualifications for membership may be made more stringent, but the first thought of every man who comes to the Rand is to find some friends to talk to who have ideas in common with his own. Of course there is a Caledonian Society, more or less restricted to Scotsmen; and each European nation, Italian, French, German, etc., has its own special club or home.

Besides the associations that are based on patriotism there are others that arise from kindred occupations or associations. Cricket and football associations are legion; nearly every school boy or office messenger belongs to some such club. If he does not he forms a club of his own and gets other boys to join. Of course there are gun clubs, kennel clubs, golf clubs, hockey clubs, chess clubs, turf and other clubs apparently without end, and richer members of the community who are asked to be patrons of them all are not to be envied for their correspondence. Debating societies spring up in connection with the churches, and people with literary and artistic pursuits have not been slow to follow the fashion. Indeed, every kind of association has flourished on the Rand just because there has been until recently so very little home life. The man who lodges in an attic of a six-storied building and takes his meals at a restaurant has few other means of passing his time when the day's work is done. Therefore Freemasons, Oddfellows, Buffaloes, Good Templars and other semi-secret societies abound on the Rand out of all proportion to the population when compared with the membership of those organisations in England.

Then there are the associations for the protection of commercial interests, which wield so great an influence that Government officials rarely see a day pass without some protest or appeal or suggestion reaching them from

the Chamber of Mines (Gold Mine Co.'s), or the Chamber of Trade (wholesale merchants), or the Chamber of Commerce (retail merchants). Masters combine to protect themselves against their employees. Every kind of handicraft has its Trade Union, and woe betide the "blackleg" who acts independently. Hairdressers, licensed victuallers, builders, architects, lawyers, accountants, estate agents, etc., each have their "Trade Society"; many have a build-



THE TRADES HALL, JOHANNESBURG.

ing in which to meet, and some have their own weekly or monthly newspaper, and even their own co-operative store.

If a man comes from England where he has been used to such organisations, he expects to find them in Johannesburg. If he does not find them he inaugurates them. It is just the same with religious opinions. If a man has belonged to a Baptist congregation in the homeland and does not find a similar place of worship in the village where his work lies, he looks about for other Baptists until he forms the nucleus of a congregation. The club fever has

been caught by the women also, a Ladies' Calling Club being the newest symptom.

Finally there are the usual social clubs, the political clubs, and the gambling clubs. The last-named need not be detailed; the political clubs have only lately begun to arise in view of possible Party Government in the near future, but the large social clubs in the city compel attention.

First in point of affluence, age and membership is *The Rand Club*, which was founded in 1887 by a number of men who had been associated in Kimberley. It has recently built magnificent new premises at the corner of Commissioner and Loveday Streets at a cost of £120,000, and its assets are worth at least half a million sterling. The furniture and appointments imported from England are of the most comfortable character, and the membership roll extends to nearly 1,500 names. There are 60 bedrooms on the upper floors; the general dining-room will accommodate 350 guests, the library (over 4,000 volumes) is the best in the city, and every facility is given to members to entertain their friends privately. The entrance fee is 55 guineas and the annual subscription twelve guineas. It is the club of the Mining Houses and the Stock Exchange.

Loveday Street is the Pall Mall of the Rand. Nearly opposite the palace just referred to is *The New Club* (entrance fee fifty-five guineas, subscription twelve guineas). There are over 1,200 members. This is the commercial club of the city, but many of its members divide their favours with the older club across the street. There are only a few bedrooms for the accommodation of country members who may be visiting Johannesburg on business.

Since the war there has been a large influx of young men from England with limited means and scholastic associations. For these the costliness of the Rand or the New Club amounted to a prohibition, nor were the prevailing interests identical. Then it occurred to a few Government officials that a social club for people with educational qualifications would meet a felt want. A site was acquired in Klein Street, between Smit and Wolmarans Streets on Hospital Hill, and a commodious build-



ing erected in the Dutch style of domestic architecture. This is known as the Athenæum Club. It was opened in February 1904. The qualifications for membership are education at an English public school or university, interpreted so as not to exclude any army officer or civil servant who may be considered a desirable member. The entrance fee is twenty guineas, and the annual subscription eight guineas. There are over 700 members already.



RAND CLUB, COMMISSIONER STREET, JOHANNESBURG.

A feature of this club is that ladies are admitted as guests, for whose accommodation a special dining room and a drawing room, approached from a separate entrance, are set apart. The Lieutenant-Governor of the Transvaal Colony is President of the Athenæum Club.

The Trades Hall, shown on a previous page, was built for the artisans as the headquarters of the Trade Unions, of which there are fifteen in the city. It was opened in May 1905. The Recreation Hall is very commodious, and is a source of much enjoyment to the workmen and

their families. There were about 600 members at the time of writing this account.

A more recent addition to Johannesburg Clubland is a building at the junction of Claim and Plein Streets, near the Freemasons' Temples, built for the Liederkrantz Society of German gentlemen. It was opened in July 1905, and is very sumptuously appointed.



THE ATHENÆUM CLUB.

The Goldfields Club at the corner of Rissik and Jeppe Streets was opened in November 1903. It has 500 members, some of whom are excellent chess players.

The Roman Catholics have built for themselves a social club, which has over 400 members; the men belonging to St. Mary's Church (Anglican) are contemplating a similar enterprise; and the Young Men's Christian Association has long been a popular institution.

C. A. L.

### Johannesburg Theatres.

*His Majesty's Theatre* in Commissioner Street, opposite the Carlton Hotel, is the newest and principal place of amusement at present in Johannesburg. It was opened in July 1903. For some time past it has been used almost entirely for the representation of musical comedies of the type which has its home in the London 'Gaiety.' The population of Johannesburg is not yet large enough to support very long runs, but a good production can be certain of payable business for at least a month; miners from all parts of the main reef helping materially to keep things going. Trains are very convenient for them.

Next in present importance is the *Standard Theatre*, adjoining the General Post Office. It has been open since 1890, at which time it competed with two others that are no longer in existence. One was called the Royal and the other the Queen's. There was also the Globe Theatre, which has been rebuilt as *The Empire* for Variety Music Hall business. This has succeeded so well that a new and grander "Empire" will shortly be built, nearly opposite to His Majesty's. All the theatres are comfortably, and even luxuriously, furnished. *The Gaiety* is a small theatre built soon after the Standard. It is now used for Yiddish plays and amateur productions.

Most of the companies now performing in South Africa are touring combinations from England. Messrs. B. & F. Wheeler, Messrs. Sass & Nelson and Mr. Leonard Rayne are the leading *entrepreneurs*. They practically control between them everything theatrical outside the music halls, but each of those firms has its recognised department. Messrs. Wheeler look after musical comedy, Messrs. Sass & Nelson light comedy and Mr. Rayne the legitimate drama. The Empire Palace Company similarly control the halls.

The enterprise of these firms has enabled some of the best talent of England to visit South Africa profitably. The most noted actors and singers who have been seen and heard in Johannesburg include Messrs. Edward Terry, Lionel Brough, William Barrett, Harry Nicholls, Huntley Wright, Ben Davis, Santley and Signor Foli. The ladies include Mesdames Albani, Kate Vaughan, Genevieve

Ward, Marguerite MacIntyre, Jennie Lee, Ada Crossley, Agnes Delaporte, Amy Grace and Madame Pasquali. One result of the visits of such well-known entertainers is that nothing which is not first-rate has the slightest chance of support. A standard of excellence has been set which is at times hard to maintain, and the constant expense of transporting fresh players and scenery has to be met by high prices for admission. The popular and traditional pit has, therefore, been abolished in Johannesburg.



JOHANNESBURG GENERAL POST OFFICE.

### Transvaal Post Office.

The following statements extracted from the report of the Postmaster-General for the year ending June 30 1904, will give some idea of the volume of business.

1903-4.	Posted for the Transvaal.	Posted for other countries.	Received from other countries.
Letters and Postcards	13,273,208	11,574,354	11,489,608
Registered Packets	240,370	217,662	188,912
Newspapers, Samples, &c	2,845,722	1,916,238	5,879,900
Parcels	69,876	49,530	185,594

---

MONEY ORDERS		ISSUED		AND		PAID.	
No.	Amount.			No.	Amount.		
	£	s.	d.		£	s.	d.
1903-4: 331,100...	1,357,569	13	2	—93,366...	382,932	1	0

---

SAVINGS BANK		DEPOSITS		AND		WITHDRAWALS.	
No.	Amount.			No.	Amount.		
	£	s.	d.		£	s.	d.
1903-4: 114,645...	1,386,233	5	4	—59,282...	1,196,468	12	6

---

TELEGRAMS.—Forwarded 1903-1904: Inland, 1,304,003; forwarded cablegrams, 55,043; transmitted (all classes), 839,673; received (all classes), 1,351,538. Total, 3,550,257.

---

TELEPHONES.—The number of exchange connections on June 30, 1904, was 1,554. In addition there were 264 extensions and 188 private wires. The daily connections at the Johannesburg exchange frequently number 28,000.

---

### Recreation Grounds.

Although Johannesburg is not too generously provided with parks and breathing spaces, its needs in this respect have not been overlooked in its rapid growth. Hitherto, these have been little more than barren spots, surrounded with the ubiquitous eucalyptus and harbourers of dust. During the last two years the Town Council has endeavoured to improve these public spaces by laying out and planting them in a suitable manner.

*Joubert Park*, about 40 acres in extent, is situated immediately to the north of the railway line between Wilhelm Street and Twist Street. It was first laid out in 1889. Eucalyptus and acacia trees had been so liberally planted that they threatened to consume all the virtue of the ground. A scheme is in progress for improving this park by removing many of the original trees and substituting others of a more ornamental character. All plants

and trees are to bear correct designations. Over 2,000 different varieties have been planted. The conservatories, which are in a somewhat dilapidated condition, will soon be replaced by much larger buildings. A kiosk is in course of erection at a cost of £4,000, and £650 will be spent on a band stand to accommodate 50 players.

*Union Ground.*—Due south of Joubert Park, on the south side of the line, is a much smaller, but very popular



THE FOUNTAIN IN JOUBERT PARK, JOHANNESBURG.

recreation reserve known as the Union Ground. It is a first rate playground for old and young men, and on half-holidays wears a lively appearance, as our illustration shows.

*Hermann Eckstein Park*, 210 acres in extent, was presented to the town in 1902 by the Braamfontein Company, the owners of the Sachsenwald Estate, of which it forms a portion. Five acres have been put aside by the Town Council as an arbor nursery, and over a million seedling trees are being reared to meet future demands of Johannesburg parks. The few animals already installed here form the nucleus of a zoological collection, which, it is hoped,

will be largely increased as soon as suitable buildings have been erected for the purpose.

*Milner Park* is at present a large tract of barren ground comprising 260 acres and situated north-east of Braamfontein between the Hospital Hill ridge and Parktown west. Designs for laying out the whole area are now being called for. A sum of £60,000 will be spent on the park during the next six years.



THE UNION GROUND, JOHANNESBURG.

*Jeppé Park*.—South of the railway line, was remodelled in August 1905 and provided with a fountain. It is a popular playground for children.

*The Oval*, Jeppéstown, was laid out in 1896. It was remodelled and planted in September 1904. In this park stands a monument erected to the memory of the founder of Jeppéstown.

*Troyeville Park* is six acres in extent. Since this park was handed over to the town, the voracious eucalypti have been removed and their places re-planted with other trees.

*End Park*, situated in an angle formed by the junction of End Street and Nugget Street, is divided into four



portions and is intersected by the railway. The southern and largest portion was laid out in 1903, the remaining sections are now being laid out according to fresh designs. Three tennis courts have been constructed on this ground by the Town Council.

*City and Suburban Park.*—This open space adjoins the mine of the same name, and is in course of being laid out.

*Rotunda Park*, Turffontein, ten acres in extent, is now being properly laid out and planted with roses and flowering



BIRDS' NESTS AT AUCLAND PARK, A SUBURB OF JOHANNESBURG.

shrubs. In addition to the above parks, there are seventeen public spaces in various outlying townships of the municipal area, but none have as yet been taken in hand by the Parks Committee of the Town Council. The planting of trees in the streets has engaged the attention of this Committee, and will be started as soon as the necessary tree-guards have been secured. A good selection of trees has already been purchased for this purpose, and a start will be made with 1,500 trees during the coming season.

A. H. S.



### Frankenwald.

This estate, which is situated some eleven miles to the north of Johannesburg and about four miles north-west of the Dynamite Factory, Modderfontein, has recently been presented to the Transvaal Government in trust for the people of the Colony by Mr. Alfred Beit. It comprises 2,600 acres, of which 1,600 acres represent Mr. Beit's actual donation, the remainder having been purchased by



TREE CULTURE ON THE FRANKENWALD ESTATE.

the Government in accordance with the terms of the gift. Of the total area 800 acres are accounted for by plantations and roads; some 155 acres are at present under the plough, while there are 25 acres of vineyards, six of orchards, six of vegetable gardens and four acres of nurseries. Ten years ago the estate resembled the surrounding veld, save for a solitary willow and an old Dutch homestead. To-day it forms a striking illustration of what skill and perseverance can accomplish in utilizing the rich soil of the Transvaal.

Frankenwald is to be devoted to educational purposes, and it has been suggested that it should be the site of the future Transvaal University. At present it remains what it was under its late owner, an experimental farm.



IRRIGATION METHOD, FRANKENWALD ESTATE.

### Johannesburg Public Library.

In order to understand the present development and constitution of the Public Library, it is necessary to call to mind some incidents in its career since it began to have a history of its own. This history may be held to date as far back as 1889. The need for a literary resort was keenly felt by some of the early pioneers, and on March 20, 1889, a public meeting was held under the presidency of Sir Thomas Scanlen. This meeting unanimously decided in favour of the proposed library, and a committee was appointed. In order that the matter should take practical shape, a public subscription was opened, and donations to the amount of about £700 were received. Rooms were *secured in the Y.M.C.A. building in Pritchard Street, and*

the Library, then in the day of small things, was sent on its way rejoicing. The number of volumes amounted to about 1,000, representing all classes of literature. As years went on, the popularity of the Library grew by leaps and bounds, so much so that the committee had to face the question of providing a suitable building. Over £7,000 was collected for that purpose, and in 1898, the first portion of the present building was erected at a cost of £15,000. The stock of books increased until in the pre-war year the number exceeded 9,000 volumes. After the war, the popularity of the Library increased with great rapidity.

For the year ending 1898, the number of subscribers amounted to 750. For the year ending 1904, the number exceeded 1400. In like manner the resources of the Library increased, and the total income at the end of 1904 was £5,584, as against £1,814 at the end of 1898. The past two years have seen quiet but steady expansion. The Seymour scientific section deserves attention. It was formed to perpetuate the memory of the late Major Seymour of the Railway Pioneer Regiment. For this purpose a sum of over £11,000 was subscribed. Although still in its infancy, this section promises to be one of the most valuable collections of scientific books in South Africa.

The need for a Free Reading Room in Johannesburg had been keenly felt, but want of funds prevented the committee from opening such a room prior to 1904. In consequence, however, of an increased grant from the Government, and a grant from the Town Council, a room was provided and declared open by Lord Milner on December 19, 1904. The crowded state of the room ever since its opening is the best justification the Committee could desire.

Every effort is being made to bring the collection of books in the Lending and Reference Libraries up-to-date, but this will take time. For the year ending 1904 over 3,000 volumes were added to the shelves. A glance at the works added will show that the committee are prudent in their selection giving special heed to those more *valuable and costly* works in all departments of literature.



INSIDE OF THE SUBSCRIBERS' READING ROOM, JOHANNESBURG PUBLIC LIBRARY.

which few can afford to buy and possess, but which many are glad to have the opportunity to borrow or refer to. A new catalogue is now in preparation and the books have been classified on the most approved methods.

The Johannesburg Public Library owes its present state of efficiency to a few citizens who through good and bad times have never remitted their efforts to make it a living force in the community. Much has been done, but much remains to be done. All that the Library Committee desire to obtain in this important branch of educational work is active sympathy and intelligent public interest. By this alone will their work attain the results they hope for.

### Transvaal Technical Institute.

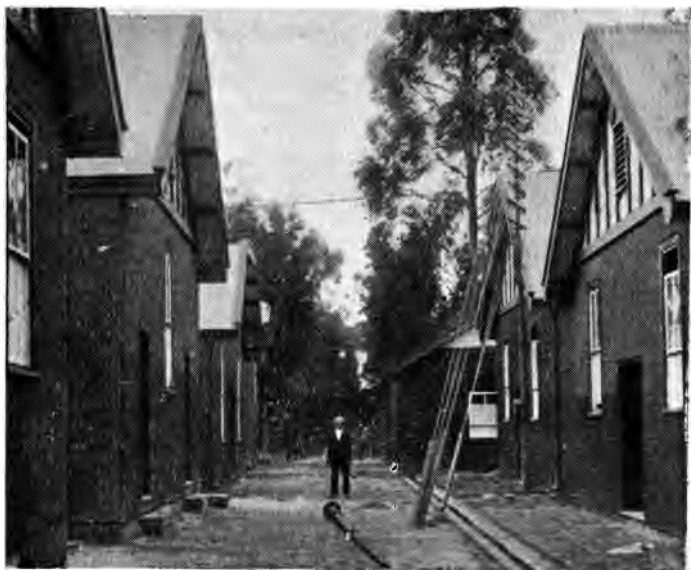
In August, 1902, on the invitation of the then Director of Education, the Witwatersrand Council of Education co-operated with the Education Department to confer as to the best means of promoting Technical Education in the Transvaal. It was then agreed that a great need existed for the highest kind of technical education and that Johannesburg was the proper centre for it. It was also urged that such technical instruction should be considered as part of a larger scheme, in fact, a Teaching University was the desired goal—and that a Commission should be appointed to consider the best means of bringing into existence such an institution.

The Commission was appointed on January 2, 1903. It held nine meetings, two of which were public, for the purpose of hearing evidence, and in the following July presented a Report, which was signed by twenty-nine Commissioners. Only one Commissioner dissented, and he drew up a "minority report"; but his only objection was based on the possibility of the permanent university being built elsewhere than in Johannesburg. Three cardinal measures were recommended by the Commission:—(a) Temporary premises for technical, scientific, and literary education in Johannesburg (b) a permanent institution of the nature of a polytechnic, and (c) the subsequent but early establishment of a Teaching University. The ideal for the

Teaching University is Birmingham—as a centre of industry—rather than Oxford or Cambridge, with their antiquity and comparative seclusion. The recommendations of that Commission were at once adopted by the Government, “so far as funds at disposal would allow,” and a corporate body was appointed under the title of Transvaal Technical Institute, which held its first sitting on September 8, 1903. The first thing done was to establish classes for the 3rd and 4th years’ courses of the South African School of Mines at Johannesburg, in temporary buildings on Von Brandis Square. This put an end to the Kimberley School of Mines. The next thing to be done was to provide suitable accommodation for the Technical Institute; and the Government accepted the suggestion to set aside Plein Square for the purpose. One-half of the Square is occupied for the time being by the Municipal Offices. The vacant half was put at the Institute’s disposal. Money for the somewhat primitive one-storey, barn-like, temporary premises was borrowed from the Government (£7,500). About 60 students are at present under instruction, whose fees constitute but a very small proportion of the cost of conducting the Institute. Government, however, has promised £8,000 a year towards current expenses, and the Witwatersrand Council of Education has promised a further £4,500 yearly. When the Town Hall has been built on the Market Square, the rest of Plein Square will be at the disposal of the Institute. By that time it will be known how far the Government and the public are willing to provide for a permanent building. The present buildings are only wood and iron shanties, but the fittings will be found as complete and costly as in old country institutions.

The ordinary work of the Institute is done in the daytime; but the evening classes are arranged in all the subjects of study. The buildings are within two minutes’ walk of Park Station, and students are allowed to travel at half-fare, so that there is no difficulty experienced by non-residents of Johannesburg from the standpoint of accessibility. A hall of residence is, however, provided at Highfield Terrace, Doornfontein, with accommodation for 50 students. *The hall of residence is under the control of a Warden and*

Dean. The Seymour Section of the Public Library is at the disposal of students, but a library at the Institute is much to be desired. For the day work the fees are £32 per year. For evening classes one guinea per term for each subject. Sectional evening classes are held at Pretoria, Roodepoort, Krugersdorp, Boksburg and Potchefstroom; supervised by the Professors from Johannesburg. Corres-



TECHNICAL INSTITUTE TEMPORARY BUILDINGS.

pondence classes are to be instituted for the more distant districts of Volksrust, Pietersburg, Standerton and Heidelberg until such time as it may be practicable to organise regular classes. It will be seen that there is plenty of work before the Institute, and no one can question the present and future advantage which the Transvaal will derive from this earnest endeavour to provide the best possible training for our young men within easy reach of their homes and their work.

C. A. L.

### The Rand Water Supply.

When the Municipality of Johannesburg first came into existence in May, 1901, it was faced by the fact that the water supply was in the hands of a private company, which had the power to charge 40s. per thousand gallons, and actually did charge 10s. per thousand gallons to the consumer. The height of the ridge on which the city is built made it clear that the water supply would always be a serious element in the cost of living. At the same time, as regards the mining areas, there was no comprehensive scheme in hand which would secure a sufficient supply to feed the batteries which would be erected in the course of the next few years.

In July, 1901, the Town Council of Johannesburg, after consultation with the Chamber of Mines, approached the Government and suggested the appointment of a Commission to investigate whether the domestic and industrial water supply of the Rand should not be entrusted to a single public body, with powers to deal with the whole area from Randfontein to Springs. The Commission appointed in 1902 reported in favour of this proposal. After some delay an Ordinance was passed under which the Rand Water Board was constituted a statutory body, consisting half of members representing the Municipalities interested and half of members representing the Mining interest, with a chairman appointed by the Lieutenant-Governor. The Commission recommended that, owing to the difficulty of finding a homogeneous security upon which the Board could borrow money, the necessary funds should be raised on a Government guarantee. The Government was unable to give effect to this recommendation, and the Water Board accordingly drafted an elaborate measure which empowered them to raise the necessary funds and to secure the loan on the rateable value of the whole area, including the mines, and overcame the difficulty raised by the fact that mining claims were exempted from rating for ordinary Municipal purposes. Provision was also made for the reconstitution *of the Board and for the expropriation of all existing interests.* The measure proceeded very closely on the lines



of the Metropolis Water Act of 1902, by which the London Water Board was established and under which the expropriation of the Water Companies has been effected. There is one important difference in principle, however, between the London and the Rand Water Boards. In London it is the duty of the Water Board not only to obtain water in bulk but also to supply to the consumer in retail. The Rand Water Board, on the other hand, has nothing to do with a retail domestic supply. Its functions are confined to obtaining water and supplying it in bulk either to individual mines or to any of the six Municipalities into which the Witwatersrand is divided. The distribution of the water so supplied is left to the Mining Company or the Municipality. This measure is of great importance to the Rand because it will enable water to be supplied not only at cost price, without any margin of profit, but also, by dealing with the problem on a vast and comprehensive scale, will secure that the main supplies are obtained in the cheapest possible manner. But to the country at large it is of even greater importance. Had each of the six Municipalities and each group of mines been left to obtain water independently of one another they would, in the first place, have been driven to obtain their supplies either by boring into the dolomite or from the actual springs which issued from the same formation. The Witwatersrand would, in a word, have been driven to rely, for its ultimate supply, on the natural storage of the country which might have become so depleted as to seriously affect the springs and rivers upon which its agriculture depends. It would in fact have been drawing upon the capital reserve fund of the country in the shape of water. Now, however, that all water consumers on the Rand have been federated under a single body, the joint supply which it will be necessary for that body to obtain will be so large as to render it financially possible for a dam to be constructed at the outlet of a large catchment area so as to impound during the rainy season waters which would otherwise run off down the rivers and be lost to the country. In a word this general scheme enables the Rand to add to the water capital of the country by means of storage, instead of diminishing that capital by

drawing upon the natural stores in the dolomite. The sums paid for acquiring and consolidating the various private water rights amounted to £2,200,000, and for this purpose, together with a further £1,200,000 for extension of works, a public loan of £3,400,000 was issued on Government security.—*From Government Reports.*

## THE OBSERVATORY.

(TRANSVAAL METEOROLOGICAL DEPARTMENT.)

The Government Observatory is situated on the ridge of hills famous as the Witwatersrand. It is  $2\frac{1}{2}$  miles, as the crow flies, E. N.E. from the General Post Office. This institution was established by the Government on the initiative of the local branch of the South African Association for the Advancement of Science. It was hoped that the Government might be able to start an observatory, both for the studies of the meteorological and astronomical sciences, but at that time (1902) the Government could only accede so far as a meteorological department was concerned.

It is hoped by the leading citizens and people interested in Science, that the Government may soon be able to equip the Observatory with a powerful telescope. The fine site and its situation in a clear and brilliant atmosphere, some 5,900 feet above sea-level, would render such an addition to the altogether too meagre list of powerful telescopes in the Southern Hemisphere, one of unusual advantages.

The site was partly presented by a Dutch family. Neighbouring land was purchased so as to secure the Observatory against encroachment. The Meteorological Department is at present in full working order. The Observatory itself was formally opened by H. E. Lord Milner, on Jan. 17, 1905, when Sir David Gill, the Mayor of Johannesburg (Mr. Geo. Goch), Mr. T. Reunert, President of the South African Association for the Advancement of Science, and many others were present. It is fully equipped with the latest self-recording instruments. The Observatory also acts as head-quarters for a body of 300 to 400 voluntary

observers in all parts of the Transvaal. One annual report has been published and the report for the season July 1, 1904 to June 30, 1905, is now being prepared for press.

The chief defect of the Johannesburg climate, an indirect one due principally to the long dry season, is undoubtedly its dustiness, which at times is excessive. There are great hopes that in course of time a means of abating this evil will be found. If a similar dry period occurred in England, the dust-fiend would, we may be sure, be equally active.



THE OBSERVATORY, JOHANNESBURG.

It is never too warm at Johannesburg. The cold weather comes in sudden spells of short duration. The valleys in calm weather have higher and lower temperatures than are found on the neighbouring hills.

The rainfall is about 30 inches, which falls on 90 days, but as the greater part of the rainfall takes place in heavy thunder-showers, the actual duration of the rainy weather is very short. Thus, in the period of twelve months which ended on May 31, it rained in all for 187 hours.

The following table gives figures derived from the first twelve months' work at the Observatory :—

1904	Temperatures					Rainfall		Sky		Humidity	
	Mean	Mean Max.	Mean Min.	Highest	Lowest	Inches	Days	Cloud 0-10	Sunshine, % of possible	Mean Max %	Mean Min, %
June	51.0	59.6	42.3	65.7	32.5	0.31	4	0.3	90	...	...
July	51.3	60.2	42.4	67.0	34.0	0.01	1	0.6	95	...	...
Aug.	54.9	65.5	44.3	76.6	32.5	0.02	1	0.4	98	52	21
Sep.	56.4	67.8	45.0	79.5	26.5	0.13	2	2.3	82	61	20
Oct.	61.8	72.9	50.8	82.5	37.8	0.79	7	3.7	76	68	29
Nov.	65.4	75.5	55.4	88.3	47.2	4.77	9	2.2	65	75	45
Dec.	62.3	72.0	52.6	81.8	40.0	3.27	5	4.6	56	81	53
1905											
Jan.	65.6	75.3	55.8	81.2	51.5	3.28	15	5.0	60	90	56
Feb.	64.4	73.1	55.7	80.7	46.8	3.30	19	5.5	45	94	62
Mar.	61.2	69.8	52.6	80.4	42.0	3.42	14	5.1	55	93	58
Apl.	61.1	70.3	52.0	74.8	44.4	1.54	10	1.4	81	80	50
May	55.0	63.9	46.0	71.2	30.0	0.35	3	1.3	80	58	36
Year	59.2	68.8	49.6	88.3	26.5	21.19	90	2.7	74		

Taking the climate of Toulouse, as typical of the famous health resorts on the Mediterranean, a comparison between it and that of Johannesburg Observatory shows that in every way that of Johannesburg is superior.

	Observatory at Johannesburg	Observatory at Toulouse
Warmest month	65.6	71.1
Coldest	51.0	35.1
Range	14.6	36.0
Highest Temperature	88.3	94.8
Lowest	26.5	15.8
Absolute Range	61.8	79.0
Cloudiest month (0-10) 9 a.m.	5.5	8.2
Clearlest	0.3	5.2

The figures for Toulouse are for 1901, the latest year available. The annual sunshine at Johannesburg exceeds that of the Riviera by 720 hours.

R. T. A. I.

## Hospitals of the Transvaal.

Except in Johannesburg, where a considerable share of the cost is met by local contributions, the maintenance of Hospitals has hitherto been defrayed by the Colonial Treasury. It is in contemplation to change this system for one which will give local authorities a measure of responsibility for the support of hospitals and also for their management. The Hospital of Johannesburg originated in 1888, when tents used for hospital purposes were pitched



THE GENERAL HOSPITAL, JOHANNESBURG.

on the present site. Since that date the buildings forming the present hospital have been erected from time to time by means of subscriptions, donations and Government grants. The site, about 12 acres in extent, was reserved by the Government for Hospital purposes. The normal accommodation of the Hospital amounts to 298 beds, of which 66 are for natives. Additional accommodation has been provided for 39 Europeans and 23 native patients in marquees in the Hospital grounds. The Stroyan Block, shortly to be erected, will provide beds for about 52 patients.

When this block is completed the marquees will no longer be used. The Hospital is at present administered by a Board of 10 members appointed by the Government. The revenue for the 18 months from January 1, 1903, to June 30, 1904, was £27,268 from fees, £50,500 Government grant, £9,657 subscriptions and donations, total £87,425.

The expenditure during the same period was £80,149 on maintenance and general expenses, £6,309 on permanent works, furniture, fittings, etc., and £31 on library, total £86,489.

In addition to the General Hospital most of the mines have hospitals for the treatment of their own employees, and there are a few small private hospitals and nursing homes in Johannesburg. The C.S.A.R. has established a small hospital at Doornfontein for the treatment of its employees who fall sick or meet with accidents. It is generally quite full.

E. S. C.

Cottage Hospitals have been built in many of the smaller towns. In some instances these were started to meet military requirements and have been continued to serve general local needs. In other instances gold-mining companies have joined with the general public in providing an hospital, but in all such cases hitherto the maintenance has been materially aided by grants from Government. All the mines have hospital provision for their coloured labourers, for the cost of which the companies are alone responsible.

---

### Johannesburg Cemetery.

The main entrance to the general cemetery is a full mile from the Market Square, through Braamfontein. It is controlled by the Municipality. The area is about 160 acres, being half-a-mile square. At present about 20,000 white persons have been buried in rather more than 15,000 graves. The cosmopolitan character of the city is well evidenced by the arrangement of the ground into separate sections for people of distinct creeds. The largest sections are for the Anglican, Roman Catholic and Dutch Reformed communities. British non-Episcopalians have a section to

.

themselves. Small sections are set apart for the military, the police (including the S.A.C.) and the Fire Brigade. Hebrews have a separate enclosure and make their own arrangements for interments.

Malays (Mohammedans) also have a separate enclosure and bury according to their racial customs. Christian Kaffirs have a place apart from "raw" Kaffirs, and the Cape "coloured" people are also kept distinct. Indians have a place to themselves and so have the Chinese. Some curious native customs are in evidence at the Chinese graves, particularly the joss sticks, feet towards the west, and Chinese characters on the tombstones.

The European portion of the cemetery is well laid out in walks and thickly planted with cypress and other trees. The monuments are of average excellence and great variety. There are no ridiculous epitaphs. There are two public monuments worth attention—one of a small granite obelisk in memory of seventy-five white and coloured people who "lost their lives" through the explosion of some trucks of dynamite at Braamfontein siding on February 19, 1896. The other is erected to the officers, non-commissioned officers and men of the 1st Battalion (xxx) and volunteer companies of the East Lancashire Regiment who "lost their life" during the South African War, 1899-1902, which shows that the number killed in action (22) was nothing like so great as the number (52) who died of diseases.

There are many soldiers' graves; and the Loyal Women's Guild visit and decorate them on the Sunday nearest to All Soul's Day. The Municipality undertakes the care of them.

The cemetery is much too small for the needs of Johannesburg, and at the present rate of interment the general sections will be full in less than three years. The Municipality has advertised for a suitable suburban estate, and failing to get one a portion of the large farm belonging to the Municipality at Klipspruit will probably be used for the purpose. The general appearance and upkeep of the cemetery has been greatly improved since the war.

C. A. L.

### The Fort.

One of the finest sites in Johannesburg is at present occupied by "The Fort." It was originally a small gaol; but, as a result of the Jameson Raid, it was enlarged and fortified by the Boer Government. The new works were completed in 1897. A detachment of the Staats Artillerie then took possession and two Krupp guns were trained on the town as a stern warning and reminder for the inhabitants. With the British occupation of Johannesburg the Fort and its immediate surroundings continued to serve the double purpose of prison and barracks, until the end of 1902, when the few remaining regular troops in the town were transferred to other quarters. The Fort is now used exclusively as a prison but is very inadequate. M. B.

### Police Statistics.

An extraordinary number of evilly-disposed persons have looked upon Johannesburg as a field for lawlessness, but the police administration is gradually overtaking them. During April, 1905, the number of cases of offences reported in the Johannesburg Municipal Area, the number of arrests and the number of convictions were as follow:—

Offence	Reported	Arrested	Con- victed
Murder and Homicide ...	3	1	1
Robbery ...	19	9	9
Housebreaking and theft by day...	59	10	11
Housebreaking and theft by night	52	15	11
Theft, horse ...	1	—	—
Theft, cattle ...	12	4	—
Theft by fraud ...	28	14	6
Theft, ordinary ...	217	85	52
Drunkenness ...	489	489	379
Liquor Law ...	156	156	133
Immorality ...	3	3	1
Assaults ...	200	171	107
Bye-Laws ...	637	637	472
Miscellaneous ...	284	270	217
Minor ...	505	505	455
Rape Cases ...	3	1	1
Gold Law ...	3	3	3





WARD OF THE NOURSE JOINT HOSPITAL.



THE POLICE COURTS, JOHANNESBURG.



ROSHERVILLE LAKE, A HOLIDAY RESORT OF JOHANNESBURGERS.



MINE LABOURERS FROM SOUTHERN CHINA.

## TRANSVAAL MUNICIPALITIES.

The following pages are intended as a brief guide to the Towns and Districts into which the rest of the Transvaal is divided for commercial and administrative purposes.

The following is a list of Municipalities for the Transvaal which have been created up to date under the provisions of the Municipalities Elections Ordinance.

Date of <i>Gazette</i> .			Date of <i>Gazette</i> .		
Boksburg	...	25/9/03	Klerksdorp	...	25/9/03
Barberton	...	29/1/04	Middelburg	...	25/9/03
Germiston	...	9/10/03	Pietersburg	...	25/9/03
Heidelberg	...	25/9/03	Potchefstroom	...	2/10/03
Krugersdorp	...	25/9/03	Standerton	...	25/9/03

In addition to these the following Urban District Boards were also established :—

Amersfort	...	27/11/03	Potgietersrust	...	4/3/04
Amsterdam	...	27/11/03	Roodepoort-Florida		
Bethal	...	7/11/03	Maraisburg	...	16/10/03
Belfast	..	16/10/03	Rustenburg	...	16/10/03
Carolina	.	16/10/03	Schweizer Reneke	...	27/11/03
Christiana	...	16/10/03	Springs	...	16/10/03
Ermelo	...	16/10/03	Ventersdorp	...	16/10/03
Lichtenburg	...	16/10/03	Vereeniging	...	16/10/03
Lydenburg	...	16/10/03	Volksrust	...	16/10/03
Machadodorp	...	13/11/03	Wakkerstroom	...	16/10/03
Nylstroom	...	16/10/03	Wolmaransstad	...	27/11/03
Piet Retief	...	16/10/03	Zeerust	...	16/10/03

These bodies by subsequent legislation have been converted into Municipalities of a modified type.



BOKSBURG LAKE, WITWATERSRAND.

---

## LARGER MUNICIPALITIES

### Boksburg.\*

Boksburg is an important mining, business and pleasure centre, situated fifteen miles east of Johannesburg, and, according to the census of 1904, had a population of 14,650 within the municipal limits. The Municipality, with an area of over thirty-eight square miles, extends about six miles from east to west, and includes five railway stations:—Half-Way, Angelo, East Rand, Vogelfontein and Boksburg. The principal mining property in the Municipality is the East Rand Proprietary Mines. As a pleasure resort the town is rapidly coming to the front, as many as ten thousand excursionists sometimes visiting the beautiful lake and park in a day. The lake is to be vested by the Government in the Town Council, which is about to carry out an elaborate scheme to enhance its attractions. Included in the programme is the construction of a pavilion, refreshment room and bandstand, the provision of jetties and boats, and the widening of the tree-shaded promenade round the lake. Vogelfontein station is only five minutes' walk from the lake. Sheets of water of any size are of very great value on the Rand, and must be made the most of.

Municipal Government is vested in a Mayor and Town Council of fifteen members. There are English, Presbyterian, Dutch Reformed, Wesleyan and Baptist Churches.

Entertainments are provided in the Assembly and Masonic Halls, and music is given at the Lake and on the Market Square at regular intervals by the Boksburg and District Band.

Health statistics show that the death-rate is one of the lowest in the Transvaal. Stores of all kinds are plentiful, and as mining development is going ahead at a great rate on all sides of the town, Boksburg is considered to have an assured future before it, especially when the residential extensions contemplated are carried out. E. D.

---

\* The order in which the different Municipalities are dealt with in these pages accords with that adopted by the Government records, as indicated on page 97. An Alphabetical Index will be found in the preface pages.

### Barberton.

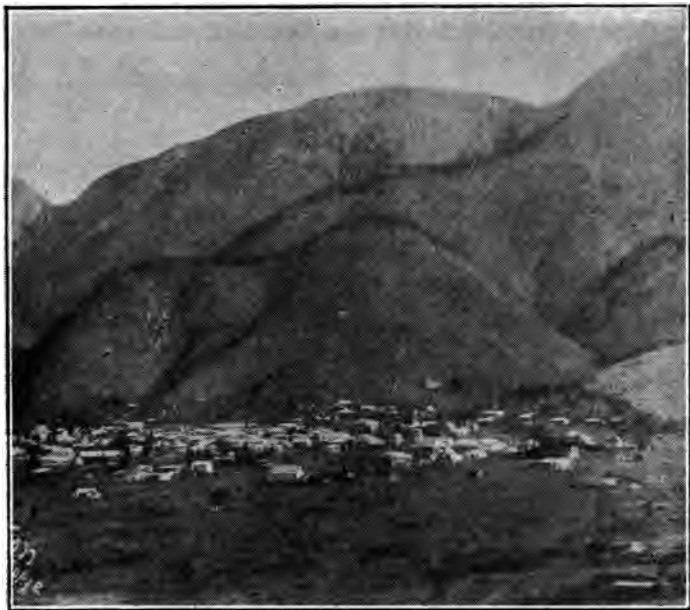
Height above sea-level, 2,800 feet. The town is 283 miles by rail from Pretoria.

Population of town, 1,205 white; 1,174 coloured. Population of district, exclusive of town, 2,803 white; 2,411 coloured.

*Historical.*—Of the ancient history of the district little is known. The innumerable small heaps of stones on the flat between the town and Heslop's Creek and elsewhere, indicate the cultivation of the ground and the one-time occupation of the valley by a branch of the Basuto tribe; further evidence of their presence is afforded by the schantzes built on the slopes and precipitous sides of the Kantoor. These people were driven out by the Swazies before the middle of the nineteenth century, and their descendants are now settled in Sekukuni's country. From the time of their expulsion to the demarcation of Swaziland by the Boers, the De Kaap Valley formed a portion of the territory of the Swazi king. There exists one distinct trace of the presence of Bushmen in the district at a period anterior to the occupation by the Basuto, a small painting on a big rock lying on the hill near the donga that divides the town from Belgravia, one of its suburbs. It is a representation of a hunting scene, somewhat weather-beaten but still fairly clear. Its preservation may be accounted for by the fact that the painting has been protected in a great measure by its occupying a hollow of the rock, probably worn by glacial action.

The history of Barberton itself dates from 1886. Four years previously attention had been directed to the De Kaap Plateau and Valley by the reported discovery of gold. The presence of auriferous reefs was soon confirmed, and in November, 1884, the country round Pioneers' Hill was proclaimed a goldfield. In 1886 came the romantic discovery of the Sheba Mine. A prospector had seated himself one day on a piece of rock a few yards off the footpath which he and his colleagues had worn in the course of an unsuccessful search for gold, extending over many months. With a hammer he idly struck off a piece of the rock, which at once arrested his attention. He had discovered what

has ever since been known as the Sheba Gold Mine. The phenomenal yield of this mine started the "gold fever" in South Africa. From all parts a rush was made to De Kaap. By the beginning of 1887 it was estimated that there were 10,000 people in the district, while Barberton was suddenly transformed from a congregation of huts into a town of considerable size, with hotels, public buildings,

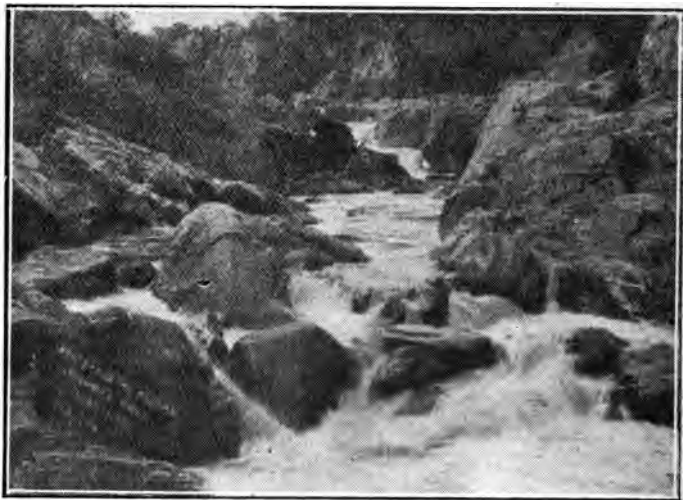


BARBERTON, FROM THE HOSPITAL KOPJE.

and subsequently two stock exchanges. Wild speculation and unscrupulous operations lead to the inevitable reaction, and the fate of Barberton was finally sealed by the steady development of the far richer Witwatersrand.

The situation of the town, nestling in semi-circular form under the shelter of a spur of the Kaapsche Berg, is one of remarkable beauty. A striking view of the magnificent amphitheatre of De Kaap Valley is to be obtained; the

bold outline of the Duivel's Kantoer, nearly thirty miles away, showing clearly against the sky; while the Devil's Knuckles, with its huge ridges well-defined, forms a prominent feature of the range. Other attractive spots in the neighbourhood are the Lomatie Falls and the Devil's Bridge. Shady creeks of great beauty seam the hills surrounding the town, In them abound giant thorns, eucalypti, cacti, aloes (the pride of de Kaap), and an endless variety of ferns, including the tree fern, with other sub-



RAPIDS ON THE CROCODILE RIVER, BARBERTON DISTRICT.

tropical trees, plants, and flowers. For the naturalist, especially the botanist and entomologist, the district provides an exceptional field of interest. Good sport with the gun is also to be had, as game is plentiful.

*Agriculture.*—Owing to the prevalence of horse-sickness and cattle-sickness, agriculture has been greatly hampered by inadequacy of transport. The fertility of the valley is beyond question. Citrous fruits are of excellent quality. *Fruit-farming* affords a fine field for men of moderate



capital, who can bring experience and energy to bear. Fruits grown are oranges, naartjes, sweet and Spanish lemons, guavas, limes, citrons, pomelmoos, mangoes, pawpaws, pineapples, peaches, grapes, bananas, etc. The suitability of the soil for tobacco culture has been demonstrated by the production of tobacco of marketable quality. This is an industry capable of considerable expansion. A great advantage possessed by the district is the mild winter climate, which admits of the cultivation of tomatoes and other vegetables at a time of the year when it is impossible to produce them elsewhere.

*Mineral Resources.*—Apart from quartz-mining, there are possibilities of gold in payable quantities in the alluvial ground of the river-beds and the Kantoort, and increasing attention is being turned in this direction.

Work has been begun on the magnesite deposits in the district, while immense coal-bearing areas have recently been pegged in the vicinity of Komati Poort.

*Health.*—The once popular theory that Barberton is a hot-bed of fever may now be regarded as exploded. By the cultivation of the soil and efficient sanitary methods, malaria has been banished from the foot-hills, and danger of fever now lurks only in the low-lying areas and along the river banks. The climate is trying in summer but in winter it offers a desirable change to the cold of the high veld.

Vital statistics for 1904 show the mortality rate for residents in the municipality to be only 5·85 per 1,000.

*Local Institutions.*—Barberton Rifle Association, De Kaap Agricultural Society, the Caledonian Society, De Kaap Mine Managers' Association and a Chamber of Commerce—the first to be founded in the Transvaal.

Local government has been successively under a Miners' Committee, a Sanitary Board, a Military Board, and a Health Board. Municipal institutions were granted in 1904.

J. B. K.

---

### Kaapsche Hoop.

*Kaapsche Hoop*, the first proclaimed township of the Kaap Goldfields, was founded in 1882. It occupies the

plateau of the mountain Duivel's Kantoor and was known as the "Kantoor." The nearest railway station is Godwan River, about 13 miles distant.

Situated 2,000 feet above the Kaap Valley, it is much used as a summer resort from the fever-stricken districts just below.

In the early mining days of 1882-1888 its population varied between 8,000 and 3,000, and it was the centre of administration for the Kaap Goldfields until Barberton



ALLUVIAL GOLD DIGGINGS, KAAPSCHÉ HOOP.

was founded in 1888. The population of Kaapsche Hoop now amounts to about 300. It was here, in 1888, that the famous "Kruger Nugget," weighing 36 lbs., was found.

The prospect from the Kantoor Range is perhaps one of the most fascinating in South Africa. From an elevation of 2,000 feet, the whole Kaap Valley—an area of, approximately, 1,400 square miles—with its peculiar volcanic formations, can be seen as a panorama. The nature of the country is very mountainous, road making being almost *impossible*. During the summer months the Kantoor is

almost continually enveloped in heavy fogs and mists, which, together with heavy rains, make an average monthly rainfall of, approximately, 10 inches. During the winter strong winds prevail.

Alluvial digging forms the chief occupation of the residents of Kaapsche Hoop. This is mostly carried on by individuals, with the help of a native or two. The ground for alluvial purposes is rich but "patchy," and, with a plentiful supply of water, a fair living might be made.



AGRICULTURAL SHOW AT DE KAAP, BARBERTON DISTRICT.

The great difficulty, however, is the storing of the water, of which there is only a supply during the rainy season.

Kaapsche Hoop is quite unsuited, on account of its elevation, for farming. In the valley, however, a large income is derived from tobacco-growing, which enterprising diggers use as a reserve occupation when gold-digging is slack. Fruit-growing is also, to a certain extent, carried on in the valley.

T. J. R.

### Germiston Municipality.

Municipal area, 26 square miles. Population (as per provisional census return, 1904) :—White, 9,414 ; coloured, 19,713—total, 29 127.

When the activities and hopes produced by the production of gold at Barberton were beginning to wane, the richness of the gold-bearing reef on the Rand caused financiers, prospectors and merchants to hasten from all parts of South Africa, and before the end of the year 1886



PRESIDENT STREET, GERMISTON, IN 1895.

conglomerate gold-beds had been tapped all along what is now known as the Witwatersrand.

Two merchants by the name of August Simmer and John Jack, carrying on business as general traders at Harrismith, Orange Free State, opened another business in 1885 at Lake Chrissie, but in addition to their ordinary *line of trade* they added a mining department. Early in 1886 Messrs. Simmer & Jack purchased the farm Elands-

fontein in the Witwatersrand district, floated the Simmer & Jack Gold Mining Company with a capital of £75,000, and started operations with twenty-five stamps. With commendable foresight, they laid out a small township about a mile from the mine. The township was named Germiston.

The name "Germiston" is taken from the farm Germiston, near Glasgow, where Mr. Jack was born. A store, hotel and blacksmith's shop were established about this period, and this was the beginning of the now flourish-



PRESIDENT STREET, GERMISTON, IN 1905.

ing and large commercial centre, Germiston, the third largest town in the Transvaal Colony.

Fortunately, Germiston was in the direct line of route of the railway which was gradually creeping from the Cape to Pretoria, and joined the Rand Tram, as it was then called, which ran east and west along the reef. The railway from the Cape reached Germiston about the end of 1892. The important junction of Elandsfontein was thus formed, and this, added to the outcrop mines which practi-

cally encircled the town, assured the prosperity of Germiston as a mining and railway centre.

About the end of 1889 Messrs. Simmer & Jack sold their interests in the farm Elandsfontein to the Simmer & Jack Gold Mining Co., Ltd., and thus commenced that huge mining proposition which gives to-day the Simmer & Jack Proprietary Mines, Ltd., of the Consolidated Goldfields of South Africa, Ltd. group, the premier place in mining operations on the Rand.

In 1896 fresh prospects were increased by the development of deep level mining, and the town was completely encircled by mining claims and operations, with the natural result that the area of the township being confined within this circle, the value of ground was considerably enhanced. The Geldenhuis Deep was the first deep level mine to start the production of gold.

After the peace settlement Germiston began to be recognised as an important centre, and under the Municipal Corporations Ordinance of 1903 was established a Municipality, with Boksburg Municipality as its eastern and Johannesburg as its western boundary.

The photographs above show one of the streets in Germiston in 1895, and the same street in 1905. They are interesting as showing the growth of this important mining town.

J. M.

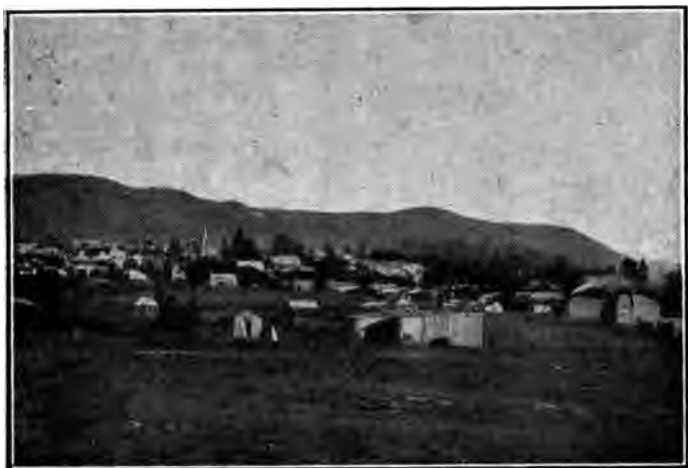
---

### Heidelberg.

The town is forty-two miles from Johannesburg. Urban population (1904 census): 1,838 white persons and 1,381 coloured persons; height above sea level, 5,029 feet.

The present site of Heidelberg was laid out as a township in 1861. Although situated on the direct trade route from Durban to the interior, *via* Harrismith, the growth of the town was slow. In the war of 1880-1 it came into prominence as the headquarters of the Boers, who had taken possession of it at an early stage in the struggle. The *building* still stands, and part of the existing public *offices, in which the Executive Council of those days met. The room in which the treaty that constituted the terms*

of peace was signed by Sir Evelyn Wood and the Boer Triumvirate is also shown to-day. Of actual warfare the town has seen but little, for both in the war of 1880-1 and in the later struggle it escaped being the scene of any conflict. A change in the fortunes of Heidelberg occurred with the active development of the Witwatersrand. Capital and population drifted into it, while, to meet its increasing requirements, the Boer Government expended considerable sums upon the erection of substantial buildings to serve as



GENERAL VIEW OF HEIDELBERG.

Law Courts, Post and Telegraph Offices, Mining Commissioner's and Customs Offices, and a well-planned and handsome public school.

*Churches.*—The Dutch Reformed Church forms the central and principal feature of the town. Besides this there are two other Dutch places of worship. The Anglican and Wesleyan Churches have been established in the community for many years. The Roman Catholics have lately secured property and have established a convent and school. Native Missions are conducted by the old established Lutheran Church and by the Anglican and Wesleyan Churches.

The periodical gatherings of the country people to attend sacrament still form a picturesque feature of Heidelberg life, but owing to the rapid growth of many other centres and the establishment in these of churches, the "Nachtmaal" of to-day is but a faint echo of what it used to be.



DUTCH REFORMED CHURCH, HEIDELBERG.

*Mineral Wealth.*—

Heidelberg has had to live through many tantalising experiences. Confident in its knowledge that the district is traversed in all directions by gold reefs, it has waited in vain to profit by some rich discovery in the immediate neighbourhood. The only mine that has entered upon a permanently prosperous career in the Heidelberg district is the Nigel, situated some eight miles north-east of the town. The Molyneux

Mines and the Molyneux West Mine raised expectations at one time, but they are now closed down. The "Coronation Reef" is located in Heidelberg District.

Coal mining is being profitably carried on at various points in the district.

*Local Institutions.*—Educational establishments comprise two Government schools (one fee-paying and the other free), the Convent school, and the Dutch "Volkschool." The total attendances amount to about 450 pupils.

The recruiting depôt of the South African Constabulary is situated in the town.

*Environs.*—On three sides the town is surrounded by undulating grass-covered country, stretching away for miles,



but on the north-west it is protected by a range of rocky hills. Here the "Kloof," with its clear stream of water, its winding paths threading their way among mimosa trees, forms an ideal holiday resort.

A. W. V. B.

### Klerksdorp.

Population (1904 census), 3,201 whites and 532 coloured; height above sea level, 4,350 ft.; 118 miles by rail from Johannesburg.

Klerksdorp is situated in the Schoonspruit Valley, 9 miles from the Vaal River, on the site of the earliest European settlement north of the Vaal River.

A party of early Voortrekkers settled at Klerksdorp about 1838, and diverted a part of

the Schoonspruit for irrigating their sowing lands on its western side at the foot of some rocky hills, and thus Klerksdorp formed the nucleus of the European settlement in the Transvaal, which gradually spread in all directions from that point. In 1886 gold was discovered on the town lands of Klerksdorp, and two years later a great rush of prospectors and gold seekers took place. In March, 1888, the Government of the late South African Republic laid out a mining township on the east side of the Schoonspruit and disposed of some 800 stands, now known as the New Township, the older settlement on the west side being called the Old Township. From time to time great interest has been taken in the gold reefs in the Klerksdorp district, but *proper scientific* and business-like development has in the



THE KLOOF AT HEIDELBERG.

main been lacking, owing to the superior attractions of the Witwatersrand. The annual State revenue from the Schoonspruit Goldfields averages about £100,000. About a dozen gold mining companies were established in the district before the late war, but only a few of these have been restarted since the cessation of hostilities. The chief obstacle to mining operations is the difficulty of obtaining fuel, the nearest coal mines being 16 miles distant in the Orange River Colony, while ox traffic over the Vaal River has been suspended owing to the outbreak of "Rhodesia red water" or "tick fever" in the Transvaal. It is hoped



BRIDGE OVER THE VAAL, KLERKSDORP.

that the completion of the railway as far as the coal mines will enable the existing companies, and many others yet to be formed, to prosecute profitable operations in the neighbourhood. In 1897 the yield of gold from the Klerksdorp district was close upon 85,000 ozs. Latterly there has been renewed activity in prospecting and mining operations in the district. Along the Schoonspruit is situated some of the most fertile land in South Africa, yielding large *crops of oat-hay, wheat and other cereals*, while the whole *of the district is capable of producing immense crops of*

mealies and Kaffir corn, which can be, and are, raised without irrigation during the summer months. The Klerksdorp district is famous for its suitability as a cattle-breeding country. Sheep and goats have been doing very well in the district during the last few years. Formerly, small stock suffered from a good many ailments, ascribed to the wildness of the pasturage. In 1890 Klerksdorp was proclaimed a township by the late Government, and since that time it has been the seat of a Special Landdost and



GOVERNMENT BUILDINGS AT KLERKSDORP.

also of a Mining Commissioner. In 1903 Klerksdorp was created a Municipality under a Town Council of twelve members. The Municipality has not launched forth into any public works of great magnitude yet, but schemes for the supply of water for domestic purposes, electric lighting and other improvements are in contemplation. A dam has been thrown across the Schoonspruit, between the old and new township, and a park is to be laid out on the open ground close by the dam, which will considerably enhance the appearance and attractiveness of the village. A hand-

some block of public buildings comprises the Magistrate's Court, Post Office, Telegraph Office, Mining Office, etc. Among other prominent buildings may be enumerated the various Churches, the Government Schools and a fine hospital capable of accommodating 100 patients. The Convent of the Sacred Heart, a handsome building standing on the west side of the Schoonspruit, within its own grounds, is a first-rate educational institution. The climate is excellent and the general health of the community is exceedingly good. The average rainfall is about 22 inches per annum. Klerksdorp is connected by rail with Johannesburg and will shortly be linked up with the Cape railway system at Fourteen Streams. Another line is in course of construction to the Vierfontein Coal Mines in the Orange River Colony.

Some 18 miles west of Klerksdorp is the pretty little village of Haartebeestfontein, with a population of about 500 white people. The neighbourhood boasts many picturesque spots along the Vaal River. J. A. N.

### Krugersdorp.

In 1904 this Municipality had a population of 4,622. It is 5,709 feet above sea level and is situated 20 miles by rail to the west of Johannesburg. It is named after the late President Kruger. It is the chief town of the West Rand and the centre of its various activities. The town is situated on the northern slopes of the Witwatersrand and enjoys westward an uninterrupted view of the Magaliesberg Mountains, a lofty range which separates the district of Krugersdorp from the lower-lying district of Rustenburg.

Krugersdorp was laid out as a township in July, 1887, on the farm called Paardekraal. Two of the chief business thoroughfares—Commissioner and Ockerse Streets—commemorate Mr. Ockerse, the first Magistrate and Mining Commissioner of the town. The district and Luipaard's Vlei Townships in the immediate vicinity are favourite residential quarters. A line of railway from Johannesburg to Klerksdorp, shortly to be extended to Fourteen Streams, *skirts the Luipaard's Vlei Township and enters Krugersdorp from the south.*

*Commercial Institutions.*—Four Banks have local branches—Standard, National, Bank of Natal and the Bank of Africa. The duty of fostering the mercantile interests devolves on the Chamber of Commerce. Agriculture is represented by the Farmers' Association, a body embracing practically the whole of the Transvaal, with its headquarters at Krugersdorp. The Executive has obtained from the Town Council a grant of a large piece of ground,

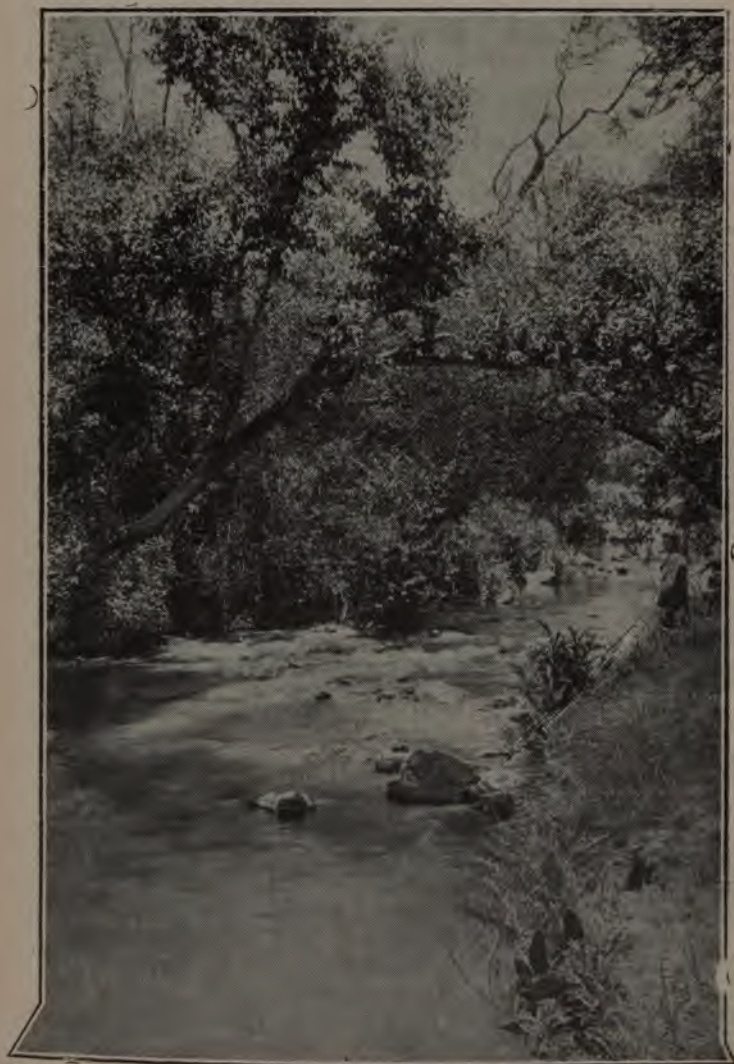


OCKERSE STREET, KRUGERSDORP.

which will be devoted to exhibitions and to the furtherance of agricultural aims.

*Educational.*—Education is liberally provided for by the Government. A school building has lately been erected at a cost of £12,000 near the centre of the town, and technical classes are held for the benefit of older students. There is an Ursuline College for girls.

*Miscellaneous.*—Public Library (low rate of subscription), Public Reading-Room (free). Clubs, &c.:—The Krugersdorp Club, the West Rand Club, the Amateur Dramatic Society, the Orchestral Society, the Caledonian Society and various Sports Clubs. Volunteering is warmly



THE EYE OF THE FOUNTAIN, NEAR KRUGERSDORP.

supported, the Imperial Light Horse, the Transvaal Scottish and the Scottish Horse having large muster rolls.

*Churches.*—Church of England, Dutch Reformed Church, Roman Catholic Church, Synagogue, and other places of worship belonging to various non-episcopal bodies.

The Town Council has laid out and is gradually forming a *Recreation Park* to the east of the town.

*Paardekraal Monument.*—This commemorates the defeat by the Boers of a large force of Zulus under their great chief Dingaan (Dec. 16, 1838). During the British occupation (1877—1881) it was the scene of a national meeting of the Boers, who, after an animated discussion lasting five days, resolved to proclaim again the South African Republic, and to recover the independence of the country (Dec. 13, 1880). In the course of the recent war the monument was damaged, but the present Government has effected a complete restoration of the structure.

*The Queen's Battery*, about twenty minutes' drive from the town in a westward direction, on the main road to Rustenburg, is another place of interest. Here Dr. Jameson's forces were repulsed on their first encounter with the Boers.

*Doornkop*, about two hours' drive from Krugersdorp; was the scene of the surrender of Dr. Jameson (Jan. 2, 1896).

*The Environs* of Krugersdorp are particularly rich in spots of considerable natural charm and beauty, among



PAARDEKRAAL MONUMENT,  
KRUGERSDORP.

which may be mentioned the glen in the Alexandra Estate, easily reached by half-an-hour's drive from town; and the gorge running in a westerly direction from Witpoortje Station, a mile or two from Krugersdorp, on the line from Johannesburg.

*The Valley of Hekpoort* (four hours by cart) is one of the most fertile parts of the Transvaal.

*Nooitgedacht*, on the high ground beyond, is the site of the battle fought between General Clements and the Boer leaders, Generals De la Rey and Kemp, and is covered with many memorial stones. It commands a wide view over the district of Rustenburg and that paradise of hunters, the Bush Veld.

F. A. C.

### Middelburg.

Middelburg, one of the principal towns of the Eastern Transvaal, is situated on the Pretoria-Delagoa Bay railway line, about 100 miles east of Pretoria. It lies in a snug valley on the banks of the Klein Oliphants River, at an altitude of 4,970 feet above sea level. The climate is both bracing and temperate. In summer the heat is moderated by an invariable breeze, which ensures coolness at nights; and in winter, in spite of severe frosts, the sun always shines brightly and warmly during the day.

To the south-west of the town are situated the Military Cantonments, which cover an area of over 1,000 acres and consist of picturesque and well-built huts and bungalows, laid out with the usual military regularity. Some thousands of trees have been planted all over the Cantonments, and what will eventually be a beautiful avenue of about two miles in length has been laid out, traversing the entire length of the ground.

An excellent rifle range has been formed in a sheltered valley to the north-west of the town, where field firing can be carried on without any danger to the public; and a sports ground is in the course of construction in the immediate vicinity of the barracks.

The town, as yet, is unable to boast of many handsome buildings, but building of villas proceeds apace. The *Dutch Reformed Church* stands out prominently, with its



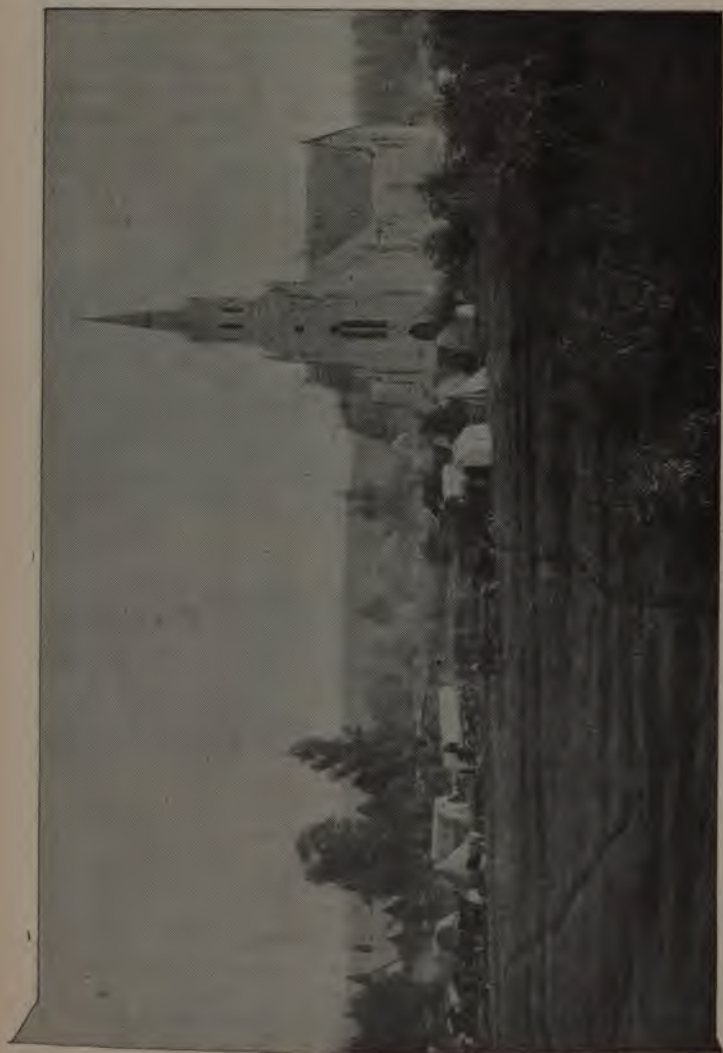
lofty spire, in the centre of the town, and there are also several other churches, notably the English Church, which has lately undergone extensive alterations—the “Gereformeerde” Church, the Wesleyan Church and the Presbyterian Church.

In the way of schools Middelburg can easily hold its own with any town in the Transvaal. The Government Free School possesses a large and handsome building lately erected by the Government in the centre of extensive playing grounds. The Dutch School has an equally fine



HOLY TRINITY CHURCH, MIDDELBURG.

building, erected by the late Government, and the Provincial School has just been granted six acres of ground, on which it is intended to erect a building worthy of the town. There is also a large and well managed orphanage in connection with the Dutch Church. The hospital at present consists of two villas rented by the Government, but a site for a permanent hospital has been granted, and the erection of the building will shortly be commenced. A new club building is to be erected in Middle Street.



NACHTMAAL CAMP AT MIDDELBURG.

It is proposed, in the immediate future, to build municipal offices on an erf which has been granted by the Government for that purpose. These buildings will in all probability contain a spacious town hall, library and suites of offices, in addition to the accommodation usually required by the municipal authorities.

As yet there is no system of electric light supply, nor an adequate water supply in the town, but these important matters are only awaiting the flotation of a municipal loan, which will shortly be issued.



GENERAL VIEW OF MIDDELBURG.

The townspeople can boast of many cricket, football, tennis and other sporting clubs, as well as a flourishing racing club, which holds quarterly meetings on the racecourse situated to the south of the town on the top of a hill.

The district is somewhat unique, comprising, as it does, both high veld and bush veld, with varieties of climate and natural features. Agriculture is carried on satisfactorily in all parts of the district, while stock of all sorts thrive equally well in the high as in the low veld. Excellent shooting can be obtained throughout the district, there being still the remains of the vast herds of springbuck and blesbuck

that, in former times, used to roam in hundreds over the plains, while birds and the smaller species of buck are to be met with in considerable numbers.

The district is rich in minerals, but is only lately being prospected to any great extent. That coal of fair quality exists all over the high veld is well known, the mines at Witbank and Brug Spruit, eighteen miles west of Middelburg town, producing thousands of tons daily. The country north of the town and railway line contains vast quantities of excellent iron ore, which as yet have not been worked.



BRIDGE OVER OLIPHANTS RIVER, MIDDELBURG.

A cobalt mine, which was worked with success some years ago is still in existence and will probably be worked again before long. Tin has been discovered in many places.

The district is rich in native labour, there being several large Kaffir tribes in the northern portion which provide hundreds of boys annually for the different mines in the neighbourhood. The mission station at "Boscobello," a most picturesque spot on the Oliphants River, about six miles to the north-west of the town, is under the auspices of the Berlin Mission Society.

H.W.

## Pietersburg.

Pietersburg is the capital of the Zoutpansberg, the largest district in the Transvaal. The Zoutpansberg is bounded on the north by the Limpopo, on the east by the Portuguese territory, and on the south and west by the Lydenburg and Waterberg, and covers, roughly, 36,000 square miles. The middle and high velds are good agricultural and grazing country; the northern portion



THE MARKET SQUARE, PIETERSBURG

wooded and mountainous and in parts tropical. The district is rich in minerals, salt pans and valuable timber; among the established metals being gold, silver, iron, copper, cinnebar, and galena. The proclaimed goldfields are the Marabastad, Houtboschberg, Selati and Klein Letaba Goldfields.

The town of Pietersburg is laid out on a large scale, and the buildings away from the Market Square are far apart. At the close of the war, building went on briskly until overtaken by the widespread depression, which

brought it practically to a standstill. Prospective buildings are a new Town Hall, for which the Government has given a site near the present Government Offices, Mare Street, by Market Square; a gaol on Government land at the north end of the town and a German Church. Pietersburg is one of the healthiest towns of the Transvaal, although there appears to be a general impression in other



A STREET IN PIETERSBURG.

parts of South Africa that it is not so, this being, no doubt, owing to its receiving fever-stricken visitors from the low country. General progress has been made during the past two years in farming, mealies, Kaffir corn and tobacco being the chief products. Coffee, sugar and rice are also produced in some parts, and fruit of almost every kind is plentiful. The population of Pietersburg in 1904 was (white and coloured) about 3,200, the numbers of each race being about equal.

T. C. P.

### Potchefstroom.

The population of Potchefstroom in April, 1904, was 6,021 whites, and 3,065 coloured persons.

Of all the towns in the Transvaal there is none, perhaps, which possesses so much historic interest as Potchefstroom—the ancient capital of the old Republic. In the days immediately following the establishment of the township by the voortrekkers—those old stalwarts of the early period of our history—the winning of the beautiful Mooi River Valley from barbarism was attended with great danger and was a time fitted with incidents of courage and endurance in fights with both man and beast. The original Old Dutch Church on the Market Square, erected in the early fifties, served a double purpose, for devotional purposes and also as a position of defence in time of war. The rudely constructed building was surrounded by a kind of loop-holed bastion from behind which the Boers protected themselves, their wives and families. It was here that the first Transvaal Volksraad sat; but it should be mentioned that a native rising brought the initial deliberations to an abrupt conclusion, all the legislators having to shoulder the gun and go forth to beat back a determined attack on the part of the natives. In those days the spirit of warfare was a characteristic of the nation then in the making, because to conquer was to live.

It was as far back as 1836 that two parties of voortrekkers, under Pretorius and Potgieter respectively, settled in the Transvaal, the first-named on the Aapies River by the Magaliesberg, and the latter at Witkopjesfontein on the Mooi River. Pretorius' township became Pretoria, while Potgieter subsequently moved his camp lower down the river and founded Potchefstroom. For years there was a keen rivalry between the adherents of these pioneer families, and it was not until 1857 that a government was formed and Potchefstroom created the capital of the Transvaal. The boundaries of this town, together with those of Rustenburg and Pretoria were, in that year, defined.

Potchefstroom was, however, a town in 1839, because old records show that it was then that provision was made

for the allocation of town commonage, no less than eleven farms being set aside for the purpose, this giving a tract of land of over 60,000 acres in extent. Even now, when many thousands of acres of the commonage have been reserved by the State, there are from 40,000 to 50,000 acres remaining for the use of present-day erf-holders in the town.

In 1862 the battle of Potchefstroom took place. S. P. J. Kruger—destined afterwards to play such a great part in the life of the State—then Commandant-General for Pretorius, bombarded the little village from Vecht Kopje, where the Military Cantonments now stand. Schoeman's force made an unsuccessful sally, but Kruger's artillery was more formidable than dangerous, for only 11 casualties occurred. In the year following, Potchefstroom had been taken possession of by Viljoen, and this time Kruger, who headed the army of the State, had to retreat.

There was no coin currency, trading being done by means of notes and barter. President Pretorius was in receipt of the munificent salary of £300 a year, and his wife was not above keeping a boarding-house and adding to the family exchequer by selling pickled cabbage or "zuurkool."

Gradually the village grew into a town, the bounties of the wonderful Mooi River and the fertility of the land added to build up an era of prosperity, and late in the seventies Potchefstroom was made a Municipality. But the inhabitants refused to pay either rates or taxes, and a few years later the Government had, perforce, to take over the administration of the town—a state of things which continued up to the time of the late war.

Potchefstroom played an important part in the war of 1880-1, and it was here that a gallant and prolonged stand was made against the Boers under Cronje. As witnesses of this siege the old fort, with the graves of many British soldiers, still remains.

The vicissitudes of Potchefstroom have been legion, particularly prior to the time when the seat of Government was moved to Pretoria. In 1889 came a short-lived boom, and the town remained in a more or less somnolent state as regards material progress until the three years' war.



Since the war Potchefstroom has developed to an almost incredible extent.

Its commercial advance has been phenomenal, and in place of a more or less straggling street, the main business thoroughfare—King Edward Street—is probably as fine as in any South African country town. With a population of over 9,000 whites and twenty-five miles of made roads, Potchefstroom comes near being the largest town in the Colony, outside of Johannesburg and Pretoria. The location of a garrison, the selection of the town as the headquarters of the Western Division, South African Constabulary, the establishment of Government and Burgher Land Settlements and an Experimental Farm in close proximity, together with its being an educational centre, are all links in the chain of Potchefstroom's progress.

Potchefstroom is in the centre of a magnificent agricultural and pastoral district, and is within easy reach of Johannesburg. Its climate is at all times delightful. The old capital is essentially a beautiful town, as the increasing number of visitors testifies. It possesses wealth untold, both in water and trees—treasures of great price in South Africa. Along the furrows in each street are streams of crystal water, and on every hand tower graceful willows of great size and abundant foliage. There are quaint, old-fashioned houses innumerable, while in the gardens and orchards flowers and fruit abound. The system of irrigation is such that every erf has its regular supply of water, and thus the eye is always charmed with the freshness of the landscape. Near the Railway Station is the Park, a delightfully shaded spot with well-kept walks and drives and trim gardens. Here are the tennis and croquet courts and grounds for hockey, football, cycling, and cricket. Fringing the town on the east are the "Meadows," comprising some 500 acres of reclaimed land, destined to become a magnificent riverside pleasure ground. Tree-planting has been commenced, and the Golf Links made by the local club are, it is said on expert authority, among the best grass links in South Africa.

Situate close to the town are the hatcheries of the Transvaal Trout Acclimatization Society, where thousands

of trout are being bred, to be distributed in the rivers and streams of the Colony. The Mooi gives promise of becoming a favourite haunt of the hardy fish. There is much shooting to be obtained in the district, and there is also a racing club and other organisations for the sportsman.

Watered by a canal—some twelve miles in length—are the Burgher Land Settlements, a scheme which has transformed a vast tract of country into a scene of activity and successful cultivation, while to the south of these and fed by another great furrow, which cost over £14,000 to construct, are situated the many thirty-acre holdings of the British settlers. Here again barrenness has, by means of the further tapping of the bounteous Mooi River, given way to fertility and luxurious crops.

So important a feature of the agricultural side of fertile Potchefstroom is the Government Experimental Farm that a brief description will be of interest, especially as it is the most successful of any in the Colony. There are four divisions, *i.e.*, crops and cattle, poultry and horticulture. In the first-named, no less than 750 acres have been placed under cultivation, and experiments are being carried on with produce, forage and vegetables of all kinds. The herds of cattle are composed of only pedigree animals purchased from the best known breeders in the United Kingdom, and the progeny of these will be distributed throughout the Colony. Similar methods are being adopted in the poultry department. The horticultural department covers some 30 acres, and is laid out, in different methods of planting, with some 2,570 varieties of fruit trees, and 450 kinds of vines. The system adopted in the orchard is one of non-irrigation and some marvellous results have already been obtained.

The military cantonments are magnificently laid out on a hill overlooking the town, and in a few years, when the tree-planting scheme comes to fruition, will be a veritable forest town. The S.A.C. cantonments, too, comprise a camp with substantial buildings on another fine site.

It is the intention of the Government to make Potchefstroom an educational centre for the Western Transvaal. The College has recently been erected at a cost of nearly £10,000, and the site being no less than 40 acres



GOVERNMENT BUILDINGS, POTCHEFSTROOM.



ST. MARY'S CHURCH, POTCHEFSTROOM.



KING'S SQUARE, POTCHEFSTROOM.



A PICTURESQUE DRIFT NEAR POTCHEFSTROOM.

in extent is said to make the finest school ground in South Africa. Potchefstroom has a branch of the Technical Institute, a Girls' High School, a Dutch Theological Seminary, a big Orphanage School and numerous Government institutions.

This development is due to the many advantages with which Nature has endowed the town and district. The fertility of the soil is proverbial. Water abounds, and whilst the seeker after rest or health finds here variety of scenery and tranquil surroundings, with a touch of the historic, Potchefstroom itself is so advanced, with its lovely residences, pretentious business establishments, and splendidly equipped hotels, that it must stand in the forefront of progressive up-country towns. Electric light is one of the modernising influences, and the Municipality have in contemplation road-making and other schemes which will still further enhance its reputation. The town's valuation is nearly a million sterling.

W. S. V. H.

---

### Standerton.

The population at the last census was 2,500 white residents, 1,108 soldiers, and 1,600 coloured people. In the whole district there are 23,000 whites. Standerton is an old Dutch town situated on the main line of railway from Natal, at an elevation of 5,022 feet above sea level, on the banks of the Vaal River and 125 miles from Johannesburg. It derives its name from that of the old owner of the farm on which it stands, a farmer named Andrian Standers, who was at one time a commandant of the Orange Free State.

It is the most important town of the Eastern Transvaal, and is the centre of a large agricultural and cattle rearing area. A large amount of wool is also produced in this district. Two of the most important drifts across rivers, viz.:—De Lange and Robert's, are on the main roads from the Orange River Colony into the Transvaal *via* Standerton.

Standerton was the scene of considerable military operations during the late war, and has now large can-

tonments with a garrison of some 2,000 men. Since the war the town has made rapid progress, and promises to become ultimately a large and important centre. The district is mainly agricultural and wool producing.

Coal has been found and worked in the district, and prospecting for minerals, etc., is being carried on. The formation is very stony; diabase, diorite and sandstone being found everywhere, with a substratum of lava. In most parts the surface soil is rich and loamy, simply needing irrigation to make excellent pasturage. Water is easily obtained by sinking wells and boring.



STANDERTON IN 1905.

The average rainfall is 24 inches, nearly the whole of which falls during the summer months from November to March. Some of the rainfalls are very heavy. During the last rainy season 2 inches fell in sixty minutes on one day, and 2 inches in sixty-five minutes on the day following. The average barometer pressure is 25.250 inches. The minimum temperature registered during the last two years was 14 degrees, the maximum temperature 91 in the shade. There is a Government Meteorological Station in the town and *several rainfall stations* in the district.

---

Great difficulty is experienced in growing trees, owing to the long dry season, and also, probably, to the great variations of temperature within a few hours.

Owing to the sharp bends on the Vaal River, a most unique sight to be seen close to the town is that of two large bridges, at right angles to each other, only a few hundred yards apart, over the same river.

The Municipal Council of twelve was established in December, 1903, in succession to the Health Board formed during the war for the control of sanitation in the town.

Since the war many new buildings have been erected, including two banks, Anglican and Wesleyan places of worship, a Masonic Hall and a Government school to accommodate 350 children. There is also a Dutch school. The Dutch Reformed Church is an imposing building.

A new water supply for the town is under construction at a cost of some £30,000, and it is hoped that the town will shortly be lit with electric light. A weir has been built across the Vaal River for the dual purpose of gauging the flow of the river and for conserving water for the supply of the town during the dry season.

It is of great encouragement to the town that the Government have decided to hold the Circuit Court there for the whole of the Eastern Transvaal, as well as making it the headquarters of the Educational Department and of the Volunteers for this part of the Colony.

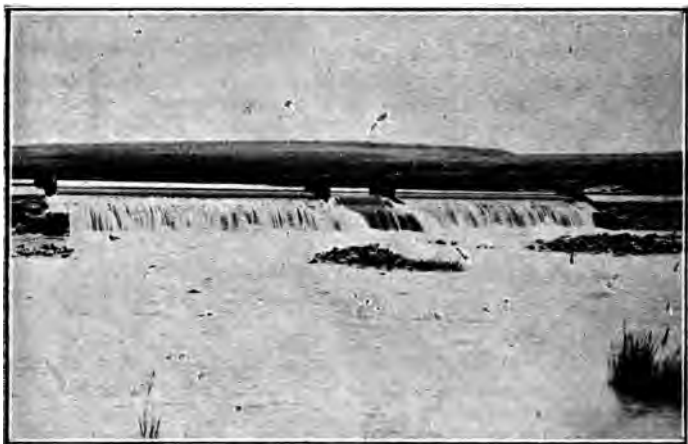
The Government have also endeavoured to improve the breed of horses in the Transvaal by establishing a stud farm close to the town, where the finest types of horses ever imported into South Africa may be seen.

There are several Burgher Land Settlements in the district, where every endeavour is made to help the poorer Boer families to earn a livelihood.

Standerton, in common with most other country towns in the Transvaal, can lay claim to no special characteristics of its own. The veld stretches for scores of miles around, typically South African in its sameness, only relieved here

and there by spruits, kopjes, and small farmhouses—not the farms that one sees at home with every acre under cultivation, but mile after mile of bare dry veld, with here and there a patch of mealies growing, and a few cattle grazing.

Brown and uninteresting to the visitor as this country may seem, it has yet a strange charm that grows upon one after a few years; when you have hunted under its blue sunny skies; when you have come to look upon Standers flat-topped kopje as a familiar friend, and have enjoyed in



STANDERTON WEIR.

quiet, unpretentious farmhouses the honest, rough hospitality of Oom Jan or Oom Piet, then it is that one grows to love the veld with its wild freedom, and to count its people as one's friends.

F. W. B. and W. H. D.

---

[The Editors have had to curtail greatly the information received from district contributors by the elimination of all references to present day officials by name, and also to omit a large number of illustrations, in order to reduce this Handbook to a convenient size.]



## SMALLER MUNICIPALITIES.

### Amersfoort.

Census population (1904), 168 whites; 53 coloured.

This township is situated in the centre of the Wakkerstroom district. It was originally but a "kerkplaats" (church place), and founded as such some thirty years ago by the Rev. Lion Cachet.

The late Government proclaimed it a township shortly before the war, and a thriving wool trade was carried on.



GENERAL VIEW OF AMERSFOORT.

During the war the neat little place (nearly all buildings having been made of stone) was destroyed, but upon the cessation of hostilities the old inhabitants returned, and things are gradually following the natural course again. The Irrigation Department is at present engaged in supplying the township with water, as Amersfoort, like all other highveld places, cannot boast of a too great supply of water.

There are, besides the Government Offices, five stores, two agents' offices, a doctor, a photographer, two blacksmiths' shops, several carpenters and contractors and a steam mill.

As in most Transvaal towns a church belonging to the Dutch Reformed community stands in the middle of the square. The Town Council consists of five members.

The climate is healthy and the prospects of Amersfoort as the centre of one of the largest wool districts cannot be considered as other than good. M. F. S.

### Belfast and District.

Belfast (population, 506 whites and 228 natives) is one of the minor municipalities of the Transvaal, situated about



THE RAILWAY STATION, BELFAST.

thirty miles east of Middelburg, on the Pretoria-Delagoa railway. It was founded in 1890 on the farm Tweefontein, the property of Mr. R. C. O'Neil, and consists of 888 erven laid out in blocks of twelve. Erven are the same size as at Pretoria, 240 x 120 Cape feet; and the town streets, 100 feet wide, run East and West, and North and South.

There is a large Market Square. Four plots, each the *size of one block* of erven, are reserved for Church purposes. *The town lands and town together* comprise 3,750 morgen.

As a municipality Belfast enjoys the unique position in this country of having neither assessment rate nor debt.

A portion of the Town Lands, 750 morgen in extent, has been granted to the Agricultural Department for the purpose of making a plantation. This ground is granted on a perpetual lease at a nominal rental.

There are also Government Reserves for South African Constabulary Quarters, Education purposes, etc.

*Waterfalls.*—Within a few miles of Belfast—on Sterkspruit Height—there is a pretty waterfall of more than 80 feet. A much grander fall of nearly 800 feet is situated on the Crocodile River, some twenty miles away.

*Bergendal*, about three miles from Belfast Station, was the position where the Boers made their last organised stand against the British troops, and a monument marks the kopje where the Johannesburg police fought until nearly annihilated.

A monument on the east of the town was erected in 1890 to commemorate the victory of the Boers over Dingaan, and a feast is held annually on Dingaan's Day to keep the memory of this great event green in the minds of the descendants of the brave voortrekkers.

The chief feature of this small town is the climate, and it is already widely known as a resort for those who in summer suffer from the heat of more low-lying districts.

Being 6,700 feet above sea level, it is admirably adapted for the cure of pulmonary diseases, and a small sanatorium has already been commenced.

From an agricultural point of view the neighbourhood is a splendid summer pasture for sheep. Cattle thrive well, and horse-sickness is practically unknown. The best crops are oats, barley and potatoes. Hardy fruits flourish, and good tobacco is grown in the Steelpoort valley.

Copper has been lately discovered about eight miles from the town, but up to the present has not been sufficiently developed to determine the value of the find.

Iron is plentiful in the Steelpoort valley, about twelve miles distant, but has not yet been worked. There is gold in the district, but not in payable quantities.

Coal abounds, and is worked on the farm adjoining the town lands on a large scale; while at Zwartkopjes, good house coal is found so close to the surface that "quarry" rather than "mine," is the proper descriptive term. Eight miles from Belfast, on Reitvlei farm, is a limestone quarry, 20 feet in thickness. G. M.



THE POST OFFICE, BELFAST.

### Bethal.

Census population (1904): 220 whites; 186 coloured.

The township of Bethal was founded some twenty-five years ago on the farm Blesbokspruit, the site being conveniently situated between Standerton, Middelburg and Ermelo. The surrounding area was proclaimed a separate district by the Government of the S.A. Republic in 1897, and returned its members to the First and Second Chambers. During this period the town became a prosperous centre of the wool trade, but showed no signs of rapid development.

The town, like many others in the Eastern Transvaal, *was* entirely demolished during the war, only four houses in *the district* escaping destruction.

On the declaration of peace Bethal was made a sub-district of Standerton; the town was rapidly re-built and is now far larger than it was before the war.

The Springs Eastward Railway has now reached Bethal. The township was created a municipality in 1904.

Among the buildings recently completed are the Town Hall and an imposing Dutch Reformed Church.

The district has always been noted as a great stock district, and it is singularly free from cattle diseases. The future possibilities are immense. Since 1902 new stock has been imported to the extent of 100,000 sheep and considerable numbers of cattle and horses.

Mealies, oats and manna are grown extensively in steadily increasing quantities, and the area of arable land under cultivation is twice as large as ever in its previous history, owing to the introduction of steam ploughs and other up-to-date agricultural machinery.

Coal of an excellent quality is found over almost the whole district, and is being developed, the lack of railway communication having hitherto prevented enterprise in this direction.

There are indications of gold and various other minerals. The climate is extremely healthy and bracing.

T. M. P.

---

### Carolina.

Census population (1904): 356 whites; 277 coloured.

A small picturesque town, situated in the Eastern Transvaal at an altitude of 5,600 feet above sea level. The site was declared a township in 1886, and was named after the wife of the donor of the land. Carolina district is sparsely populated, while the town itself comprises less than 300 inhabitants.

During the war Carolina shared the fate of most country towns away from the railway line. After being occupied four times by British forces, it was garrisoned permanently in March, 1901, when the last of the inhabitants were removed to Concentration Camps.

The chief places of interest in the neighbourhood are *Kalkoenknontz* and Warmbaths. At the former are several waterfalls, one with a fall of 80 feet. Warmbaths comprises a natural basin of water, 12 feet by 50 feet, of considerable temperature. Near at hand, however, is a cold spring, which is used to regulate the temperature of the hot bath. The construction of a sanatorium on the site has been discussed. In spite of the distance (5 hours) from Carolina, Warmbaths is frequented by the townspeople during the winter months. Geologically, the neighbourhood of Warmbaths is most interesting.

Agriculture forms the principal industry of the district. A considerable amount of transport-riding is also done, as the town is on the main road from the Delagoa Bay railway (Wonderfontein Station) to Swaziland. Coal mining is conducted on a small scale. Asbestos is receiving much attention, and farms in the neighbourhood have been recently purchased with the object of exploiting this mineral. Iron and mica have also been found, but have not been worked.

With the completion of the Machadodorp-Ermelo railway, Carolina will be connected with Pretoria and Delagoa Bay, on the one hand, and on the other with Johannesburg by the Springs-Eastward line.

H. G. R.

---

### Christiana.

Christiana, situated in the S. W. of the Colony, is a town of growing importance. It stands upon the bank of the River Vaal, which is an inestimable boon to the town's inhabitants. In the year 1870 the town was surveyed, and so received official recognition as the township of Christiana. Very modest indeed were its pretensions in those days, for in 1872 there were only some half-dozen houses standing, and the population could not have exceeded 50.

The buildings of the town suffered very little during the late war, for the place was in the continuous occupation of the British from May 16th, 1900, to the termination of *hostilities*.

Gradually a farming and transport community established itself here; and after much thought, talk and petitioning, the townspeople secured the ear of their Government, and its aid soon followed; for in the years 1885-1886 a dam was constructed across a portion of the river, some four miles to the east of the town. From the dam an irrigation canal was dug, which enclosed a very substantial part of the town between it and the river, and thus a strong inducement was offered to settlers to come to the town.

Farming and diamond digging now represent the industries of the town and district. Within the area of the town the water erven are cultivated with great assiduity, but the farmers of the district depend upon cattle-rearing. The area of cultivated lands on the farms is insignificant, and this fact is ascribed largely to the irregularity and trifling character of the rainfall.

Numbers of men are engaged in diamond-digging along the banks of the Vaal and in the neighbourhood of the town. The industry is wholly of the alluvial kind, and the diamonds are won chiefly by the aid of machines constructed on the gravitation principle. The diamonds found are not large, but they are considered to be of good average quality, and their value works out to about 80/- per carat. The value of the monthly yield during the past year was, approximately, £1,600.

During the first half of 1904 as many as 400 diggers were at work on the town diggings, but the number has now sunk to 100. The reason for the decline in the activity of the industry is set down mainly to the difficulty of securing and maintaining a proper supply of Kaffir labour.

The site of the town is about 3,500 feet above the sea level. The landscape of this district is, however, extremely flat and uninteresting. The veld stretches for miles in all directions in one vast plain, with here and there a low kopje or rounded swell at very long intervals.

The white population of the town totals 1,735, and the coloured contingent numbers 347.

G. P.

---

The illustrations for Carolina and Christiana were not to hand in time for publication in this edition.

### Ermelo.

Ermelo (population : 767 whites, 684 natives) is the chief town of the district bearing this name, and the centre of its administration. It is nearly equi-distant (about 60 miles) from Standerton, Middelburg and Volksrust; and about 40 miles from the Swazi border. It was laid out by the Ermelo congregation of the Dutch Reformed Church and proclaimed a township in 1880. At that time game was found abundantly in the vicinity. The town, with the town lands, comprises a portion of the farm Nooitgedacht, No. 10, purchased by the D.R. Church, and occupies over 3,012 morgen. It was transferred in 1896, under reservation of certain erven and the Church Square, to the late Government.

The town, which became the centre of a large trade in wool, progressed steadily up to the time of the war in 1899. Postal communication was established with Wakkerstroom by Kaffir runners in 1881, and a telegraph office was opened in 1888. At the outbreak of hostilities the population was about 600 whites and 300 natives, and there were about 1,000,000 sheep in the district. The quantity of wool then sold in Ermelo was about 10,000 bales, averaging about 400 lbs. each and realising £100,000. The town has experienced the same depression in trade that has been felt throughout the country; but, as the centre of a rich agricultural district, with a splendid supply of coal, it can look with confidence to the future, and rely on sharing in the increased wealth consequent on the development of its resources and the return of prosperity to the farmers. The town was completely demolished during the war, only one house being left intact. Nearly all the old inhabitants returned after peace, and have shown commendable energy in rebuilding their homes and places of business. It is now almost completely restored, and consists of substantial, well-built houses, very few wood and iron structures being seen. A feature of the town is the large number of well grown and healthy trees with which it is interspersed, presenting an *agreeable contrast* to the bareness of the surrounding veld.



The Government Buildings consist of a Court House and Offices, Post Office, and a Gaol large enough to accommodate 100 prisoners. The South African Constabulary and Public Works Department have their headquarters for the district in the town. An official residence for the Magistrate with some pretensions to architectural distinction, and Government Primary and Secondary Schools have been built since the war. There is also a private Dutch school.

*Churches.*—Dutch Reformed and Wesleyan Methodist. Funds are being raised to build an Anglican Church.



GENERAL VIEW OF ERMELO.

The British community is about equally divided between Wesleyan Methodists, Anglicans, and Presbyterians.

The Government Experimental Farm and Tree Nursery adjoins the town lands, 970 acres of which have been granted to the Government to serve as an outlet for the work of the Nursery. The planting of this area will add considerably to the attractiveness of the town.

Municipal government was granted in September, 1904. The yearly revenue of the Council from all sources is about £2,500.

The value of property within the municipal area is about £200,000. Government property is valued at £26,175.

*Agriculture.*—Ermelo is specially adapted for the growth of mealies. Between 25,000 and 30,000 acres are reckoned to be under mealies and about half as much under Kaffir corn, wheat, potatoes, oats, and barley. The acreage under cultivation is about twice as much as before the war. Steam machinery is being introduced, and with the advent of the railway the area under cultivation should be increased.



THE GOVERNMENT OFFICES, ERMELO.

The district is also suitable for stock farming. Horses, cattle and sheep thrive well, as it is comparatively free from cattle disease, while horse sickness is almost unknown on the high veld. Though denuded of stock during the war, it is computed that there are now about 200,000 sheep and 15,000 cattle in the district. Dairy farming has never been practised on a commercial scale. Railway communication is very badly needed for the development of agricultural resources.

*Minerals.*—Coal is abundant throughout the district. 300 tons are annually exported to Standerton and Volksrust by waggon. The mines are, however, all undeveloped.

*Schools.*—There are Government Schools at Carolina, Lake Chrissie, Amsterdam, and Waterval Boven. There are in addition 11 Farm Schools. Besides these there are 11 Private Dutch Schools, including the one in Ermelo.

*Communications.*—The chief roads in the district are fairly good. Several bridges have been erected since the war, and at various spruits and through swampy ground the roads have been mended.

Two railway lines are in course of construction—the Machadodorp-Ermelo line and the Springs-Eastwards line. The latter will pass Ermelo about twenty miles to the north, intersecting the Machadodorp-Ermelo line, and will ultimately be extended through Swaziland to Delagoa Bay.

W. H. W.



BANK BUILDINGS, LICHTENBURG.

### Lichtenburg.

Population of town, 1200 whites, 150 natives. Population of district, 6,300 whites, 9,800 natives. The town, situated about 36 miles from Mafeking and 70 from Potchefstroom, was founded in 1873. It is laid out in

large erven, and abundantly supplied with water from a fountain in the town commonage.

When the town was first established there was some doubt whether the town and a large portion of the district belonged to the natives or to the Transvaal. On this account very few of the farms were inhabited. In 1881, however, the Pretoria Convention determined the border, and the town was considered part of the Marico district.

In 1884 the London Convention changed the border



LICHTENBURG GOVERNMENT BUILDINGS.

line, adding 45 farms to the district. Stock of every description thrives well. In 1886 Lichtenburg was proclaimed a separate district.

Owing to drought and other misfortunes, the farmers are, with few exceptions, in poor circumstances. Mealies, Kaffir corn, potatoes and tobacco are extensively grown; but the want of railway communication is a serious drawback.

The township has gone ahead since the war. The *Town Council* has done its best to improve the streets and

water furrows, but as funds are scarce, a great deal cannot be done in this direction. There are three Dutch churches, eight stores and two banks.

The Agricultural Department has a farm adjoining the town where afforestation is being carried on. The trees are growing well, and will be an acquisition to the town.

Another drawback to the development of the district is the number of farms owned by land companies which are not cultivated. Since the war, however, the Proprietary Company has established a number of white settlers on the farms.

The mail coach from Potchefstroom to Mafeking passes through Lichtenburg three times weekly.

---

### District of Lydenburg.

The principal town of the Lydenburg District is situated in the North-Eastern Transvaal, fifty miles north of the Delagoa Bay railway line. It is reached by coach from Machadodorp, the nearest station on the above line. The population of the town in April, 1904, was 778 white and 745 coloured persons.

In 1845 the voortrekkers, who came through Sekukuni-land by the Magnet Heights road, followed the Steelpoort River until they reached a valley, where they established a township called Ohrigstad, after one Ohrig, a citizen of Amsterdam, Holland, who endeavoured to open up trade with them from Delagoa Bay. This town was occupied until 1852, when it was abandoned on account of the ravages made by fever, the inhabitants finally settling in Lydenburg (Town of Sorrow).

There are very few places in the district of much historical interest, the most important being Sekukuni's stronghold, which lies north-west of Lydenburg. It was here that the old Kaffir chief, Sekukuni, was finally captured, after a resistance of three years, by Sir Garnet, now Lord, Wolseley, who came up from Zululand at the close of the Zulu war.

There are numerous ruins of Kaffir strongholds on the

farm Blaauwboschkraal on the Machadodorp-Lydenburg road, which are supposed to have been built by the Zulus during one of their raids under Tchaka.

At the town of Lydenburg is the site of a fort (Fort Mary), which was held by the British during the War of 1881, and it was this force that, during its march to Pretoria, was annihilated by the Boers at Bronkhorstspuit.

Notable places of scenery are very scarce. There is, however, a fine waterfall at Waterval Boven, on the



HOMES WHENCE NATIVE LABOUR IS RECRUITED.

Delagoa Bay line, and also some stalactite caves near Pilgrim's Rest.

The principal industry is farming, but owing to the great ravages caused by horse-sickness, various cattle diseases, locusts, etc., it is not in the flourishing condition one would expect from the great possibilities which abound on every side.

The future of the district from mineral possibilities is great. There are various gold-producing mines in the *district*, the principal one being at Pilgrim's Rest, but until

communication by means of railways is established with the outside world, the exploitation of the district is greatly handicapped. At Magnet Heights in the north-west of the district is an enormous iron deposit, part of which is magnetic, and millions of tons of ore are in sight.

This deposit, worked on the scale it warrants, would, without doubt, not only furnish all the iron necessary for manufacture of the mining and agricultural machinery used in South Africa, but would offer a supply to other countries as well.

---

### Machadodorp.

5,280 feet above sea level. The town is situated 155 miles by rail from Pretoria. Population (1904), 237 white, 264 coloured.

In 1878 a railway line which it was then proposed to build from Delagoa Bay to Pretoria was surveyed as far as the site now occupied by this township by Colonel Machado, afterwards Governor of Lourenço Marques. The railway scheme, however, was not carried through until fifteen years later, when the farm Geluk again became a large railway camp and depôt for railway material. A new village sprang into existence, and on the suggestion of President Kruger, was called Machadodorp after Colonel Machado.

Machadodorp is the meeting point of several highways. The transport roads to Carolina and Ermelo, to Swazieland and to Lydenburg start from here, while the railway line connecting it with Ermelo will shortly be opened.

During the late war Machadodorp became an important centre. After the occupation of Pretoria it was for a short time the "seat of government." President Kruger and various heads of departments lived here and transacted affairs of State in railway carriages, his officers, officials and burghers thronging the small village. On August 28, 1900, General Buller made his entry, and Machadodorp from that time was used as a supply depôt for the Eastern and North-Eastern Transvaal. The fight at Helvetia could be watched from Machadodorp, and a few days later, on January 10, 1901, a determined attack was made by the

Boers on the village itself. After the war, a Repatriation Depôt was established here, and gave great impetus to the growth of the village.

Machadodorp was not proclaimed as a township until December 30, 1904, when the Urban District Board, established in the previous February, gave place to municipal government.

Many mineral possibilities are claimed for the neighbourhood, but hitherto coal only has been exploited. A marble quarry is being opened up within a short distance of the township.

There is a warm sulphurous spring in the immediate vicinity, over which a bath-house has been built.

W. J.



RESIDENT MAGISTRATE'S OFFICE, NYLSTROOM.

### Nylstroom.

Population (1904 census)—361 whites ; 238 coloured.

When the early Voortrekkers came to the water course which runs through the Waterberg district, they imagined that they had discovered a portion of the River of Egypt, so *they called* their settlement " Nile-stream."



The sandy soil of the neighbourhood gave colour to this notion, for the town itself was laid out on a sandhill. The founders were very disappointed when their river proved to be nothing more than a tributary of the Limpopo. The town of Nylstroom is the capital of the Waterberg district, which has been called the district of promises and its inhabitants "Micawbers," but so far the hoped-for mineral wealth has not turned up, despite a multitude of shareholders who were induced to put up their money for



GENERAL VIEW OF NYLSTROOM.

the purchase of large tracts of territory. Two men, named Cohen and Widder, once brought in a bottle full of nuggets and gold dust, which they had raked in from somewhere, but they died of fever before they had time to tell anyone of the actual spot. At present, the district is mainly pastoral, especially in the Crocodile River valley, but rinderpest and war stepped in to prevent the multiplication of flocks and herds. The few people in the district who are comparatively well off are those who brought in

fresh cattle a few years ago and have stuck to their business.

Agricultural work is now in progress, but natural surface water is scarce. There is, however, more than sufficient rainfall to serve the purpose, if properly conserved, and steps are being taken to that end. With a good system of irrigation and with artificial manures, the farmers expect to show profitable returns. The new settlers imported from Europe are gradually becoming accustomed to the climate,



A TYPICAL SOUTH AFRICAN COUNTRY STORE (NYLSTROOM).

the soil and the natives. Fruit trees, both tropical and sub-tropical, flourish wherever planted, and orange groves are springing up in many places. Viticulture has been neglected, hitherto, but vines grow well and yield good crops.

The first store established in Nylstroom was put up in 1882. It overlooks what is now the Market Square, and is a flourishing concern with many branches. It now enjoys the benefit of healthy competition. C. A. L.

---

The illustrations for some of the following municipalities did not, unfortunately, arrive in time for inclusion in the Handbook.

### Piet Retief and District.

Practically the whole of the land comprising what is now known as the Piet Retief District was granted about thirty years ago to a Mr. M'Corkindale by the late Boer Government of the Transvaal. M'Corkindale promised the Government to settle this country with Scottish settlers, mostly drawn from the Industrial Schools of Scotland.

The district is a long and narrow one running along the Swazi border, and farther south forming a wedge between Zululand and Swaziland. The Boer idea in granting this concession was to have a sort of buffer state, inhabited by Scottish settlers, between themselves and the Swazi and Zulu nations.

As M'Corkindale could not provide the necessary number of settlers, the scheme proved a failure, and most of the land had to be sold. Some Boers bought large farms, but most of the best parts were acquired by German settlers, who are now amongst the wealthiest farmers in this district.

The smallest Republic that ever existed, certainly in regard to the number of inhabitants it contained, is now included in this district. Three Boers obtained a grant of land, equal to about three farms, from one of the Swazi kings. They started a Republic, giving it the name of the Klein Vrij Staat (Little Free State). One of the three, named Bezuidenhout, became President, and his son Chief of Police. The other white inhabitants were all officials of some sort or other. The happenings in this small Republic before the Transvaal Government took it over would supply splendid material for a novel.

In regard to the products of the district, Luneburg oranges are considered about the best in the Transvaal, and Piet Retief tobacco is fast making a name for itself. Mealies, except in years of drought, are always a good crop, and wheat grows very well on irrigated lands in winter. Game is still fairly plentiful. The Government has set aside a large reserve on the Zulu border.

The Assegai, Inkompies and Usutu Rivers provide good sport for the disciples of Isaac Walton.

There are indications of many kinds of minerals, but nothing has been found yet in payable quantities except coal.

The natives in the district, who are mostly offcasts from the Zulu and Swazi nations, number 30,000.

The white population of the district is 2,046.

The township was laid out in 1885, and has a total population now of 341 white and 687 coloured persons.

Hot springs exist in several parts of the district.



TOBACCO PLANTATION, PIET RETIEF.

### Potgietersrust.

3,550 feet above sea level. 138 miles by rail from Pretoria. Population (1904): 348 white, 122 coloured.

Potgietersrust is picturesquely situated on the northern railway line, midway between Nylstroom and Pietersburg, at the entrance to Makapanspoort. The town is surrounded by high hills, and enjoys an exceedingly mild climate.

It was founded by the Voortrekkers in 1860 as a base for their hunting expeditions northwards, and for a certain *period* considerable agricultural progress was made.

Troubles, however, arose with the natives, and after a series of conflicts with the tribes in the neighbourhood the village was abandoned. In one of these fights Piet Potgieter—after whom the town is now named—met his end.

A rich fertile soil and an abundance of water, in conjunction with an exceedingly mild winter climate, enable the residents to cultivate oranges, bananas, grapes, figs and almost every kind of sub-tropical fruit. Even coffee trees may be satisfactorily cultivated in the higher



ORANGE PLANTATION, NEAR POTGIETERSRUST.

parts of the town. Experimental farms have been established at Pruisen and Ronderboschje, where tobacco, cotton and the castor oil plant are being successfully grown.

The limestone formation of the hills in the vicinity is now being utilised for commercial purposes.

Owing to its sheltered position from the east winds, its mildness of climate and entire freedom from dust, the town forms an ideal health resort, and is known locally as "The Sanatorium of the North."

Makapan's Caves in the limestone formation are situated some twelve miles N. E. of Potgietersrust. These

caves—a favourite place for local picnic parties—were the scene of the fight in which Commandant Piet Potgieter was mortally wounded.

Moord Drift, a few miles S. of the town, was the scene of the revolting massacre by Makapan's Kaffirs of the first Boer hunting party who travelled to this part of the Waterberg. The tree upon which the bodies of the unfortunate victims were exposed is still to be seen.

Maishukye, on Magalakwen River, was the scene of the first fight of the Boers under Commandant (afterwards President) Kruger and the Mapelas tribe. In this conflict hundreds of natives threw themselves over the precipices and perished. Of considerable interest too are the Bushmen's Caves in this vicinity.

Since 1904, when municipal government was granted, a Town Hall has been erected, and many new buildings have sprung up. The Government School is a fine building. There is a branch of the National Bank, also a free reading-room and library.

G. H. M.

---

### Municipality of Roodepoort-Maraiburg.

This municipality lies between the municipal areas of Johannesburg and Krugersdorp. It comprises an area covered by the following farms: Paardekraal, Vogelstruisfontein, Roodepoort and portions of Waterval, Weltevreden, Wilgespruit and Witpoortje, and includes the townships and villages of Roodepoort, Hamburg, Florida, Maraiburg and Greymont.

ROODEPOORT, the largest of the above, is a fast growing mining and commercial centre, and owing to the much better class of building which is now being erected is improved almost out of recognition from its pre-war days when it was little better than a mining camp.

FLORIDA, a pretty little village, is fast becoming a popular residential suburb of Johannesburg.

Its present chief attraction is a small lake, which is a favourite pleasure resort of holiday-makers and picnic parties from Johannesburg and district.

The district, which in common with most other places in the Transvaal, had no Local Government before the war, was declared to be under the jurisdiction of a nominated Health Board on the 5th June, 1902. The Board consisted of the Magistrate as chairman, and four local members nominated by Government. This arrangement was superseded by a Proclamation in 1903, which declared the district of Roodepoort-Maraïsburg to be an Urban District Board. Ordinance No. 41 of 1904 changed the



FLORIDA LAKE, WEST RAND.

title of Urban District Board to that of "Municipality," the powers, however, remaining unchanged.

On the 1st of April, 1905, Roodepoort-Maraïsburg was declared to be wholly under the provisions of Ordinance No. 58 of 1903 (the Municipal Corporations Ordinance) and thereby had the title and dignity of a municipality conferred on it; the Chairman of the Urban Council becoming first Mayor of Roodepoort-Maraïsburg.

The Council has been able to effect a considerable improvement in the district, but owing to its limited revenue and its policy of not attempting to borrow money until times should be better, a good deal yet remains to be done in the way of road-making, lighting, etc. The municipality suffers in comparison with many other municipalities in that it possesses no Town Lands or endowment of any sort. Another disability under which the Council at present labours is that all land outside stand-townships is held under claim licence, and is therefore not rateable and brings in no revenue, and would, moreover, prove very expensive to acquire if wanted at any time for municipal purposes. It is hoped, however, that the Financial Relations Commission appointed by Government may be able to offer some measure of compensation for the loss of these revenues. The Rand Water Board is expected to be able to supply the Council with water early in 1906. At present water is derived from wells sunk on individual holdings.

The district possesses historical interest from the fact that it was at Wilgespruit, within the municipal area, that Mr. Fred Struben made his great discovery of the Witwatersrand goldfields, and in December, 1885, erected there a five-stamp battery, the first to be erected on the goldfields of the Rand. Although it is true that Struben's "Confidence Reef" was a quartz vein, and not the famous conglomerate or "Banket" formation which is the characteristic of the "Main Reef," yet to Mr. Struben must be given the credit of having been the discoverer of the Rand goldfields. There is little doubt that he was the first person to recognise the auriferous nature of the banket formation, and was the first to locate a payable banket reef, which he did in March, 1886, on farm Vogelstruisfontein, and which is now called the "Bird Reef," and lies a little to the south of the Main Reef, the true gold-carrier.

The latter was accidentally discovered by a man named Walker, who made the discovery of a banket formation while quarrying stone for the erection of a cottage, and reported the find to Mr. Struben; who was then able to locate the Main Reef series on the western portion of



Vogelstruisfontein, and on this great Main Reef series has been built up the greatest gold-mining industry in the world.

It is worthy of note that the North Rand Reefs, which are adjacent to Struben's "Confidence Reef," after lying neglected for nearly twenty years, are now being prominently brought to the public notice. The late "strike" near Witpoortje, which is of a very rich nature, has also helped the belief that the North Reefs may after all be the carriers of gold in payable quantities.

Doornkop, the scene of Dr. Jameson's defeat by the Boers and the finale of the ill-fated Jameson Raid, is also within the district.

J. S. M.

### Rustenburg District.

The District of Rustenburg, situated in the Western Transvaal, is one of the largest districts in the country.

It is, however, in comparison to its size, but sparsely populated, containing 20,000 whites and 40,000 natives.

There is but one town in the district, that of Rustenburg, which is also the seat of Magistracy. The town itself contains some six or seven hundred inhabitants. It is one of the oldest towns in the Transvaal, and many of the old thatched roofed mud-floored houses still standing give it a very picturesque appearance.

The town was at one time the meeting-place of the Volksraad, and in one of the streets is still to be seen an immense old tree under the shadows of which, it is said, it was customary to hold church services before the present existing churches were built.

This district has always had a peculiar interest as having been the home of the late President Kruger.

The climate of the district is sub-tropical. The soil is composed chiefly of either black or red loam.

It is possible to grow practically any kind of fruit or vegetable, while cereals and tobacco do remarkably well. The great drawback to the district, however, is scarcity of water. No irrigation works of any kind have as yet been made, and the only cultivated farms are those where irrigation can be carried on by the very primitive method of

drawing water by means of a furrow from some river, or where the farmer is sufficiently fortunate to have one or more sufficiently strong springs rising on his ground to water a small patch of land.

Given a means of saving the surplus water in rainy seasons or of obtaining artesian water the district has great possibilities before it.

Oranges and tobacco are the chief articles for which the district is at present famed. The finest oranges in the country are grown in this district, and it is the home of the well-known Magaliesberg tobacco, so named after the Magaliesberg range of mountains which passes through the district. Rustenburg tobacco is known throughout the length and breadth of South Africa, and an attempt is now being made to introduce it into the English markets.

A railway is soon to connect Rustenburg with Pretoria.

R. M.

### Schweizer-Reneke.

This little township lies in the Western Transvaal, on what has been presumptively called the Hartz River. On some maps it still retains its old Kaffir name of Mamusa. Its history, as recorded by the older inhabitants of the town, dates from January, 1882, when two rival Koranna chiefs made war with one another over a question of territory. The one was called Mankorane, who was supreme in that portion of British Bechuanaland where Vryburg now stands. The other was Masouw, who ruled the old stad of Mamusa. Each of these chiefs obtained the assistance of white volunteers, on the understanding that they were to receive land for their aid. The 28th of July of the same year found Mankorane badly defeated, and Masouw inflated with victory. The British Government, to prevent further trouble, defined the boundaries of the little Republic of Stellaland, which existed until 1884, when President Kruger went to England and signed the convention which gave the Transvaal its present boundary.

Masouw was then in Transvaal territory, and was *accordingly* called upon to pay hut taxes. This he persistently *refused to do*, with the result that General Joubert, with a

small commando, was sent to remonstrate with him. The two forces met on a kopje to the north of where the present township lies; and one of the white men endeavoured to disarm a native who was flourishing a gun defiantly. A shot was discharged, and the fight immediately became general. About ten white men were killed, and Masouw's little army was almost annihilated.

Masouw was found, in his jacket of brown velveteen, dead where he had fallen, with two bullet wounds through his body. At the back of the kopje the graves of the white victims may still be seen, enclosed for protection by iron rails. The victims included the two men whose names are perpetuated in that of the white man's town which they gave their lives to establish, Captain Schweizer and Field-Cornet Reneke.

The district has little or no scenery to boast of, excepting perhaps the wild kloofs of the Morkani Rand, where the baboons still reign by undisputed right of possession.

It is adapted for stock-farming, but is too dry for agriculture. The hopes of Schweizer-Reneke people are now reposed in the exploiting of numerous farms for gold. As yet mining is in embryo, but if reports are to be believed, Schweizer-Reneke's best days are yet to come.—W. E. W.

---

### Springs.

The town of Springs is situated 31 miles east of Johannesburg and forms the terminus of the Springs-Randfontein section of the C.S.A. Railways. A line is in course of construction thence to Delagoa Bay, *via* Ermelo, which will greatly decrease the distance from that Port to Johannesburg. Trains are now running on the first section to Bethal.

Springs has for many years been a large coal centre, and there are at present four collieries working, the daily output being about 2,500 tons.

Boring operations have revealed the fact that the farms upon which coal is being mined are highly mineralised, and the proclamation of the district as a gold-field is arranged for as soon as the necessary preliminaries are completed.

All round the municipal area are diamond drillings, and the results ascertained so far are most satisfactory.

The Geduld Proprietary Mines, Ltd., are busy sinking six shafts near the town. Adjoining the Geduld Property is the Cloverfield Mine, and here also shaft-sinking is actively proceeding. At Welgedacht there is a combined coal and gold proposition. Not far away are the sites of the Lace Proprietary Mines, Grootvlei Syndicate, East Rand Mining Estates, Ltd., and others, where the borings have recently given promise of great things in the future.

Judging from its name, Springs should have a good supply of water, but this is not so; and the want of it has helped to keep the place in the background. Had water been plentiful there is no doubt that the importance of the place from a railway standpoint would have been greatly augmented. This disadvantage will shortly be remedied.

Another difficulty the town has had to face has been the scarcity of building ground. Most of the ground is the property of the mining companies, and persons desirous of building have had to be content with putting their erections upon ground granted by the mines on monthly tenancies. This has now been remedied, for the Government (which is the owner of the farm "Springs") laid out and in December last sold a township, every available erf being purchased at a good price, the highest being £600. The Geduld Deep, Limited, followed suit by offering for sale 900 stands, and a good many were disposed of. Both business and residential premises are now springing up quickly, amongst them being an hotel and a Masonic Temple.

Government values the mineral rights in the farm "Springs," containing some 816 morgen, at £500,000.

The town boasts of a fine Government school, a handsome Post Office, banks and railway station.

Religion is represented by the Presbyterian and Anglican places of worship. Wesleyans, Roman Catholics and Hebrews are also moving in the direction of obtaining accommodation for their adherents.

The Town Council is negotiating for the purchase of a valuable block of property in one of the main streets, part of which is being used as municipal offices and the re-

mainder as dwellings. The Council is also taking in hand the laying out of streets and the planting of trees throughout those townships.

The area of the Municipality is 28·039 square miles, or 17,945 acres. The present population is—White, 1,500; Coloured, 5,000.



INDIAN GRASS AT VENTERSDORP.

### Ventersdorp.

Population:—480 whites, 368 natives. This village derived its name from the first owner of the farm on which it was built. It lies on the Schoonspruit River, five miles below the source. It is situated 32 miles from Potchefstroom and 24 miles from Frederikstad, the nearest railway station. The Schoonspruit, a strong permanent stream rising out of the Dolomite formation, runs through

Klerksdorp into the Vaal River, and forms throughout its whole length a valley of conspicuous fertility. In and around Ventersdorp wheat, barley, oats and other cereals are grown to perfection. Roses and many other flowers may be seen in bloom for nine months in the year. The geological formation of this neighbourhood is not without interest. It is claimed that the Black Reef and the Hospital Hill shale run through the Town Commonage. The Ventersdorp boulder beds commence on the west, and are exposed for several miles in that direction. Granite is also found about two miles south-east of the village. Traces of lead, manganese, copper, and other minerals have been discovered in the vicinity. Some interesting specimens of chert arrow and spear heads and other Bushman relics have been found. T.O.H.

---

### Vereeniging.

Population : 455 whites, 456 coloured.

Vereeniging is a small township at Vaal River on the border between the Transvaal and Orange River Colony. It was founded in 1892 by Messrs. Lewis & Marks, under a charter from the Government, and is adjacent to the coal mines and clay works of that firm.

Politically, it is well known by its being the scene of three events of considerable importance in the recent history of South Africa. The first was at its inception in May, 1892, when the meeting of Presidents Kruger and Reitz took place there, and is identified with the "Closer Union Policy." The second was in 1895—the closing to traffic of Viljoen's Drift (the name of the ford or "drift" across the Vaal River at Vereeniging) which brought about the "Drifts Question," and an ultimatum from the Imperial Government. Finally, it marked the closing scene in the late war, by its being selected for the camp where the Boer leaders discussed and settled the Terms of Peace with Lords Milner and Kitchener.

The scenery to an artist would probably appear flat and uninteresting, but to the geologist it affords unique at-

tractions ; a section of all the series, from the Amygdaloidal Diabase to the most recent, being exposed within a short distance. There is abundant evidence of glacial action in the conglomerate which forms the base of the coal beds. Striated boulders and erratics are plentiful, and root markings at right angles to the bedding planes are to be seen.

The sandstones and shales of the coal measures contain specimens of every fossil known to the Permo-carboniferous flora in South Africa, and also plant remains bearing an affinity to those of the Northern Hemisphere, which fact



RAILWAY BRIDGE ACROSS THE VAAL, VEREENIGING.

has been used as evidence of the joining-up or junction of two groups.

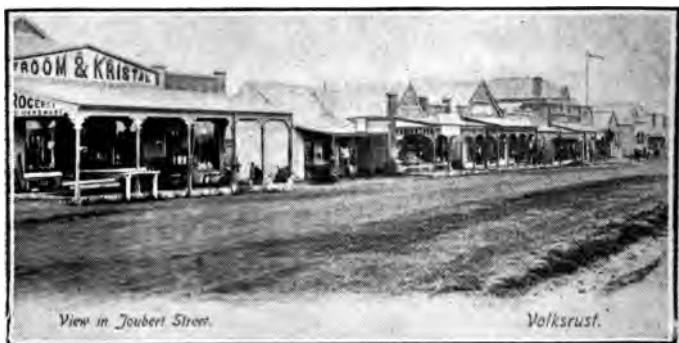
Although Vereeniging is still in embryo as a modern town, it was undoubtedly a place of note in Paleolithic times, stone implements in great variety being found in river drift; while flakes, chips, and unfinished implements are so numerous that one may reasonably conclude a great workshop for their manufacture existed there.

T. M. L.

### Volksrust.

Population:—1,342 whites, 907 aborigines, 133 colored. Height above sea level, 5,433 feet. The town is 175 miles by rail from Johannesburg.

Volksrust was laid out as a township in 1888 on portions of the farms Leanwarne and Sandfontein, purchased for that purpose by the Government of the South African Republic. The town was little more than a stopping place for post-carts and a customs post until the



construction of the railway from Charlestown to Johannesburg. From this time Volksrust began to assume the position of "border town," railway centre, and "port of entry." It became also a receiving and distributing depôt for the trade of the whole South-Eastern Transvaal. Prior to the outbreak of the war its population fell short of 1,000. It was occupied by the Imperial Forces under General Buller in June, 1900, and, being garrisoned continuously during the remainder of the progress of hostilities, suffered little during the war.

Since the war Volksrust has rapidly advanced, first-rate shops and dwellings have been built, roads and other public works are in progress, and the Town Offices have the reputation of being the finest Municipal Buildings erected in the Colony, outside of Johannesburg. There is



an agricultural market twice a week—on Wednesdays and Saturdays.

There are two Government Schools, several comfortable hotels, and the usual places of worship. The town is supplied with water from a dam at Schuilhoek. 1s. per 1,000 gallons is charged to those who use it.

*Majuba Hill*, of military fame, is about  $1\frac{1}{2}$  hours' drive from Volksrust, and commands a magnificent view of this hilly district.

C. A. L.



### Wakkerstroom and District.

Wakkerstroom district (including Piet Retief) is a very mountainous one, and lies along the northern Natal boundary from the Orange River Colony to Swaziland. It is about 200 miles long and from 20 to 80 miles wide.

The western half is high veld, 5,000 to 6,500 feet above the sea, and is renowned for having always possessed the best sheep, horses, and cattle in the country. It enjoys the most perfect climate, both in summer and winter. The mountain scenery is magnificent, more especially from Castrol's Nek, 30 miles by road east of Volksrust, overlooking Piet Retief, Paul Pietersburg, and Vryheid, which lie some thousand feet almost perpendicularly below. A very extensive and grand panorama is also obtained from Joubert's Nek, above Rustfontein, where the late General

Joubert is buried ; this is some 25 miles west of Volksrust by road, and on a clear day the hills by Harrismith, O.R.C., and the whole Drakensberg are to be seen.

The eastern portion of the district varies in altitude from 3,000 to 5,000 feet above sea level, and is somewhat warmer all the year round, though also very healthy—the only fever area being by the Lebombo mountains on the Swazie and Zulu borders. Almost any fruit will grow in this middle and low veld, which is well watered ; but owing to the distance from the railway (some 80 to 100 miles), the outside world fails to enjoy the excellent Piet Retief strawberries, peaches, figs, oranges, and, last but not least, the tobacco which is grown there. It is to be regretted that tobacco growers do not combine and treat their ground and leaf, so as to ensure to the consumer an even blend. Coal exists in abundance on a number of farms.

Gold has also been found in several places, and is, indeed, being diligently worked in spite of the cost of transporting machinery. Petroleum, tin, and asbestos have been obtained, but as yet not in payable quantities.

Latterly, there have been decided advances in agriculture and stock breeding in the district. It is estimated that the area of ground under cultivation now is at least ten times more than before the war, while acres of young fruit trees have been planted and miles of black wattle sown.

Stock farming is rapidly regaining its former position, except in Piet Retief, where that terrible scourge, Rhodesian Redwater, has been prevalent for the last two years, and has played havoc among the cattle.

Many farmers have had to sell their cattle and have bought sheep, which appear more immune. Sheep certainly thrive wonderfully on both the high veld and low veld in this district. Horses do well above the Berg, but in the low-lying areas they suffer from horse-sickness, which in the neighbourhood of Piet Retief is often very bad. Consequently, donkeys fetch high prices thereabouts, as cattle are scarce, owing to Rhodesian Redwater.

*A light railway from Volksrust to Piet Retief is badly*

needed. Quantities of foodstuffs are grown, but unfortunately there is no market.

The capital of the district is Wakkerstroom, or more correctly, Marthinus Wesselstroom (contracted into M. W. Stroom), gaining its older name from Marthinus Pretorius, a former president. It has about 800 white inhabitants, and is picturesquely situated among the mountains, some eighteen miles from the railway. It contains several handsome Government offices and first-rate Higher and Elementary Government schools.

The Resident Magistrate resides at Wakkerstroom. There are Assistant Resident Magistrates at Volksrust and Piet Retief, and Resident Justices of the Peace at Amersfoort, Schoongericht and Welkom.

There are in this magisterial district six Government schools in the towns, and twelve Government farm schools; twelve Police posts scattered about the district, four Post and Telegraph Offices, and eight Post Agencies. Railway stations, Volksrust and Zandspruit.

W. G. B.

### Wolmaransstad.

The District of Wolmaransstad, with the town of that name, was created a separate magisterial and electoral district in 1905. The town population at last census was 357 white and 113 coloured persons.

The town is situated on the Makwassie Spruit, fifty miles from Klerksdorp, and seventy miles from Christiana. It is now the seat of the Resident Magistrate, who has his Assistant at Christiana, and Resident Justices of the Peace at Bloemhof and Schweizer-Reneke.

The Klerksdorp-Fourteen Streams railway passes nine miles to the south of Wolmaransstad.

The town was destroyed by the British troops during the recent war against the Boers.

A large dam was constructed immediately above it, but was found or thought to be unsafe, and cut through. When reconstructed, it will serve the town with water for irrigation purposes and materially benefit the erf-holders, and thus ensure an increase of the population.

There are no public buildings of any description, except a school.

Diamonds have been found in the district, and much prospecting is going on for both diamonds and gold.

The district, which may be described as purely pastoral, is exceptionally suited for all kinds of live stock, and no necessity exists to "trek" with stock in the winter months.

The climate is dry and healthy; it is considered very good for consumptive patients.

### Zeerust and Marico District.

The district of Marico has been called the garden of the Transvaal. It is situated in the extreme North-West of the Transvaal, has a white population of about 12,000, and a native population of about 25,000. Its area is 3,083 square miles.

The district is divided into five wards, namely, Klein-Marico, Groot Marico, Boschveld, Highveld and Malopo. It produces gold, silver, tin, copper, lead, plumbago, iron, cinnabar, coal, salt-petre, sulphur and asbestos. The agricultural products are chiefly wheat, rye, oats, barley, maize, coffee and cotton.

The district is also renowned for its fruit, both citrus and deciduous, which finds a



WATERFALL AT ZEERUST.

ready sale wherever introduced. Oranges, pompelmouses, shaddocks, citrons, lemons, naartjes, peaches, nectarines, apricots, apples, pears, quinces, figs, European and Oriental plums and prunes, cherries, vines, walnuts, chestnuts, Dutch medlars, persimmons, almonds, bananas, blackberries, gooseberries, mulberries, loquats, olives, etc. All these varieties grow profusely in the district.

*Copper.*—Of great historical value are the ancient copper mines on the farms "Vleifontein" and "Kan-



GOVERNMENT OBSERVATORY, ZEERUST.

fontein" in the Boschveld ward, supposed to have been worked by the Phoenicians.

Of equal historic interest are the enormous caves at "Wondergat" in the Malopo ward. The Matabele under Mosilikatse made their last stand there against the original Voortrekkers. Signs of the strife are still visible at "Fendlingsplaats," Klein-Marico ward, and at "Sili-katskop," in Boschveld ward.

ZEERUST is the principal town in the district of

Marico. It is renowned for its most beautiful scenery, is situated about 130 miles from Pretoria, and 36 miles from Mafeking, and has a population of about 800, exclusive of natives. It boasts of five places of worship, two Government schools, a public library and reading-room, two banks (Standard and National) besides a Government Meteorological Station, in charge of Mr. H. Dietrich, J.P., and a Government Free Nursery, superintended by Mr. A. H. le Roux. The population of Zeerust District in April, 1904, was—white 1,295, coloured 1,242.

It is proposed to build a railway to connect Zeerust with Krugersdorp and Mafeking.

Zeerust is administered by a Resident Magistrate and a Municipal Council of nine members. It has a Chamber of Commerce and an Agricultural Society.

There are two smaller towns in the Marico district, viz., *Jacobsdal*, about eight miles to the south of Zeerust; and *Ottoshoop*, about eighteen miles to the south-west of Zeerust. The latter is a mining settlement, administered by a Mining Commissioner and a Resident Justice of the Peace.

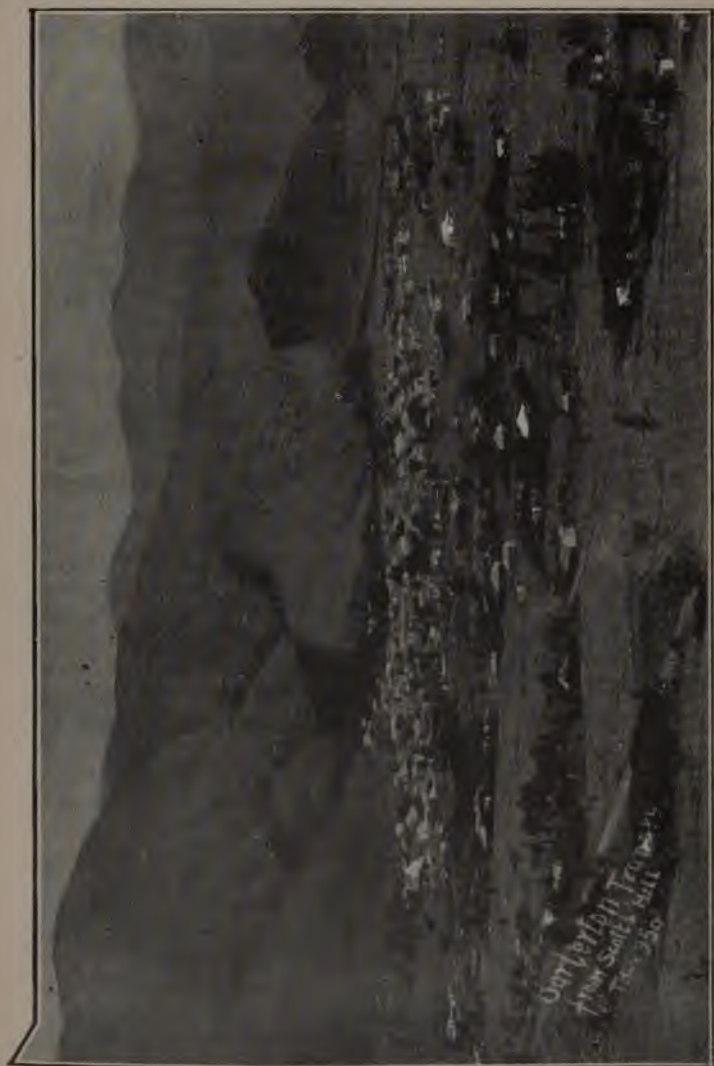


KLEIN-MARICO RIVER ZEERUST.

## GOLD MINING INDUSTRY.

### I.—History.

There is a tradition to the effect that gold was discovered in the Transvaal in 1834 by one Karel Kruger, who, in the course of a hunting expedition, accidentally found gold on the Witwatersrand, and returned to Cape-town with samples. Two years later Kruger re-appeared with a party to spy out the land and to shoot elephants. Whilst on this trip they were attacked by the Matabele near where the town of Potchefstroom now stands, and the whole party, with the exception of two of its members, was killed. After this disaster and Kruger's death nothing more was heard of gold in the Transvaal for nearly 20 years. About 1854 another discovery of gold is said to have been made; but the Boer authorities appear to have taken alarm at the possibility of mineral wealth attracting the attention of foreigners to their new country, and prospecting was prohibited under severe penalties. Some twelve years later, however, the existence of auriferous formation in the Northern Transvaal was proved by a German explorer named Mauch. By this time the Boer Government had modified its views on the subject; the restrictions on prospecting were removed, and the search for gold was prosecuted openly and with vigour. With the discovery of the Lydenburg deposits, gold-mining in the Transvaal assumed a definite character. During the next few years the sphere of active operations was extended throughout this district, and embraced Pilgrim's Rest and numerous other camps. In 1872 the first Gold Laws were promulgated, and mineral rights were formally vested in the State. Gold-mining at this period was confined almost exclusively to alluvial diggings. Reef formations remained unexploited, and until 1883 the industry eked out a more or less precarious existence in the Lydenburg district. In this



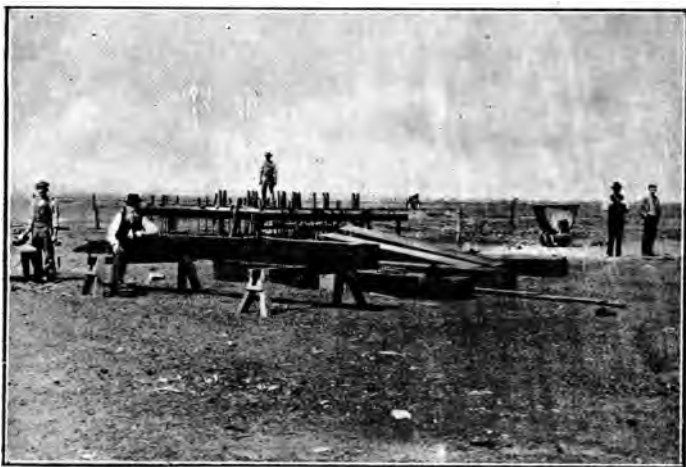
Overlook from  
from South Hill  
T.C. 1908



year the discovery of Moodie's Reef in De Kaap Valley diverted attention from the northern fields and led to a considerable influx into this neighbourhood of diggers and prospectors from the rest of South Africa and from Europe. Then followed the opening up of the famous Sheba mine, the discovery of which forms one of those romantic episodes almost invariably connected with the development of the mineral wealth of a country. After several months of unsuccessful search, so the story runs, a prospector sat down on a rock a few yards from the path he and his associates had made on their way to and fro between their prospecting area and their huts. With a hammer he somewhat aimlessly struck off a piece of the rock, which at once arrested his attention. The chance blow led to the formation of the Sheba Reef Gold Mining Company. Its shares rose rapidly and phenomenally; the first gold "boom" had set in. In two years Barberton was transformed from a mining camp to a town of considerable pretensions, with a population of 5000. The natural sequel was a wild speculation; doubtful companies were floated, and the distrust so engendered was further increased by extravagant or incompetent management. Finally, the discovery of the Witwatersrand goldfields completed Barberton's discomfiture; it no longer proved the centre of attraction, but relapsed rapidly into a town one-third of its former size.

*The Witwatersrand.*—Traces of ancient workings on the northern side of the range may be taken as a reliable indication of the fact that gold was known to exist in parts of the Witwatersrand district at a very early period. It was not, however, until the eighties of last century that this portion of the Transvaal again received practical and systematic attention. The honour of having discovered the Witwatersrand goldfields is by common consent given to Messrs. F. P. T. and H. W. Struben. Early in 1884 the two brothers commenced prospecting to the north-west of Krugersdorp, but found nothing of a payable nature. On September 18, Mr. F. Struben struck a rich vein on the farm Wilge Spruit, some twelve miles to the north-west of the Johannesburg of to-day; the brothers purchased a portion of this farm, and decided to import a five-stamp

battery. Owing to the difficulties of transport and other delays, this small mill was not erected until December, 1885. Meantime, in April, 1884, Mr. F. Struben discovered banket pebbles on the farm in which Krugersdorp is now situated, and during the same month he proved the existence of the first banket reef on the Rand. In February, 1886, his indefatigable exertions were again rewarded by the discovery on the farm Vogelstruisfontein of what is now known as the Bird Reef. Fifty tons milled from here yielded about 6 dwts. to the ton.



THE COMMENCEMENT OF THE ROSE DEEP MINE, 1895.

Although in the course of his operations Mr. Struben had discovered several banket beds and had milled ore from both north and south of the Main Reef, the actual discovery of this rich formation was made accidentally, while quarrying stone for building purposes, by a former employee of his, named Walker. The Main Reef was first located early in 1886 on the farm Langlaagte. Subsequently, Mr. Struben traced the formation to his farm Vogelstruisfontein *and* sank a shaft to a depth of 40 feet, the first shaft ever *put down on the Main Reef*. By this time the existence of

gold along the Rand was an authenticated fact. During the months of September and October, 1886, most of the farms which have since been proved to contain the richest sections of the Main Reef series were proclaimed as gold-fields, and about the same time a township was surveyed by Mr. Johann Rissik, to be called Johannesburg after his name. The news of the discoveries on the Witwatersrand reached Kimberley in July, 1886, and within a short time many of the men whose names are prominently connected with the mining industry of the Rand, including Cecil J. Rhodes, were on their way to the new goldfields. On September 14, 1886, the first large company to mine the banket formation was floated; it was the Witwatersrand Gold Mining Company, commonly known as "Knights." In July of the following year the first dividend to be officially paid by a company was declared by the Wemmer Mine, which after some two months' work with a five-stamp battery, was able to pay 40 per cent. on a capital actually issued of £10,000. This year, 1887, saw the erection of many small batteries east and west along the strike of the reef, and the commencement of the rapid growth of the mining industry. The total production for the year, according to the Chamber of Mines returns, was 23,125 ozs.; a year later it had risen to 208,121 ozs., and in 1889 to 369,557 ozs.

The early days of gold-mining on the Rand were attended with many difficulties. From the outset a scarcity of native labour made itself felt. There was no railway communication with the coast until August, 1892, and prior to this date all machinery and supplies had to be brought up by slow and expensive ox and mule transport. The rate on heavy goods by ox waggon from Kimberley was 35s. per 100 lbs. In October, 1889, the population on the Witwatersrand, numbering some 25,000 whites and 15,000 natives, was threatened with the possibility of famine unless special efforts succeeded in the immediate augmentation of existing food supplies. A bonus of £20 each to those who arrived at Johannesburg with the first 250 waggons of food supplies from beyond the Transvaal border was offered by the Government. The Natal

Government also lent its aid, and by this means the threatened famine was averted.

With the year 1890 the gold-mining industry of the Rand entered upon what may be regarded as the second stage of its development. The working methods of the first stage were based on the old established lines of amalgamation and concentration. Many processes, new and old, were brought forward at this time to treat the concentrates, but of these the old Plattner chlorination process, or some modification of it, was the one which



THE ROSE DEEP MINE HEADGEAR IN 1905.

would probably have been generally adopted had not the cyanide process put it almost completely out of court. This process was introduced by Mr. J. S. MacArthur. The first MacArthur-Forrest patent was applied for in England in October, 1887, and that in the Transvaal was dated November 28, 1888. In May, 1890, the first cyanide plant was erected by the Cassel Company on the Salisbury Mine for treating small lots of tailings and concentrates *from different mines*, in order to demonstrate to mine *owners what could be done*. It may be confidently asserted

that, with the exception of the richest mines, nearly all the properties now working and paying satisfactory dividends would, in all probability, have been failures had it not been for the introduction of the cyanide process and its successful development by various workers on these fields.

Here we may leave the history of the industry and turn to the details of gold-mining, as practised on the Witwatersrand. In passing, one would remind the visitor of a fact that will be brought home by the most cursory inspection of these mines. The Witwatersrand is not a poor man's district. The mines as a whole are low grade, requiring large capital for equipment and development, and their future expansion and success depends largely on capital and cheap labour, in order to work the large bodies of low-grade ores and deep level holdings yet untouched.

H. T. M. B.

## II.—Mining Section.

*General.*—From the geological description of the gold-bearing deposits of the Rand, it will be seen that the problem confronting the mining engineer is the working of tabular deposits of conglomerate, which outcrop at the surface, and which dip towards the south at an angle usually more or less steep near the outcrop, but decreasing in magnitude as depth is attained. Generally two reefs will pay to work, and sometimes three; occasionally, only one reef is worked. The reefs, if more than one is worked, may lie 140 feet or even more apart, or they may be quite close together. Their thickness varies from twelve feet to two or three inches. The workings in the case of a very thin reef must necessarily be much wider than the reef itself.

*Division into Mines.*—The first mines to be worked were those which included the outcrops of the reefs, and, at first, the areas in many cases held by the mining companies were only one claim\* deep. Subsequently, other

---

\* A mining claim in the Transvaal is, where reef mining is concerned, a rectangular block of ground, 150 Cape feet by 400 Cape feet, the 150 feet being measured along the strike of the reef, and the 400 feet at right angles, or approximately right angles to it. A Cape foot is equivalent to 1·033 English feet; thus a claim has an area of 1·4698 acres.

claims were acquired and certain exchanges made, but in spite of this, the areas of many of the outcrop mines are comparatively small and somewhat irregular.

When the outcrop mines began to be profitably worked, the claims lying to the dip were pegged off. Those immediately to the south of the outcrop mines were made up into convenient blocks for working, and companies were formed for their exploitation. These constitute the first row of deep level mines, and their areas were naturally for the most part larger and of more regular shape than the areas of the outcrop companies. Still further to the south there is now the second row of deep level companies. The areas of the second row deep levels are greater than the first row ; because the shafts, being so much more costly, must be arranged to serve a greater area. This implies larger mills, and generally a greater capital expenditure. From three-quarters to a million sterling is the amount required for a first row deep level for equipment and development on the basis of 200 stamps, before the milling stage is reached. The thickness, number and richness of the payable reefs expected in a property have an important effect in determining its size. At present, the ideas of Rand engineers are somewhat unsettled on the question of the best size for properties, but the tendency both in the case of outcrops and deep levels is towards larger mills and more extensive areas.

Though a number of the first row of deep level companies has now been milling for some years, it must be understood that in the poorer sections of the Rand practically no work has been done on deep levels at all. Comparatively little has been done on the second row of deep level mines even in the central section of the Rand, though the Robinson Deep is an example of a mine belonging to this zone which is now crushing with 200 stamps.

*General System of Working.*—The mines are worked by means of shafts, which form channels of communication with the surface and levels. Levels are horizontal tunnels driven along the reefs at intervals of from 150 to 250 feet, *measured along the inclination of the reefs.* Communications are made between the levels at intervals of from 300

to 600 feet. These communications are usually known as winzes, though when they have been put up from the lower level to the one above they are sometimes spoken of as raises. In this manner, the tabular deposits are divided into rectangular panels, and the ore which has been so exposed is said to be "developed." Development work is always comparatively expensive. It is followed by the profitable working away of the ore in the panels by a process known as "stopping." As the value of the ore in the



WHITE WORKERS READY TO DESCEND THE SHAFT.

different sections of a mine usually varies, it is necessary to have a considerable quantity of ore developed, in order that a fair average grade may be maintained in regular working. Considerable development is also necessary in order that there may be a sufficient number of stopping places available. For instance, a mill with 200 stamps, running full time, will crush 30,000 tons of ore a month, that is 360,000 tons in a year. To keep such a mill going, and to average the grade in a mine which shews rather irregular values,

there should be somewhere in the neighbourhood of a million tons of ore developed. When once the milling stage is reached on a mine, shaft sinking, development and stoping all go on simultaneously, the object being to develop each month at least as much ore as is stoped. Thus it will be seen that in the latter stages of the life of a mine development costs very little, whilst on the other hand, it is a heavy charge with no offset during the period before milling commences. It might be added that none of the rock in the



INCLINED HAULAGE TRACK, NOURSE DEEP MINE.

mines of the Rand can be worked by the pick alone. The invariable method is to bore holes by hand or machine drills driven by compressed air, and to blast the rock with strong explosives.

*Shafts.*—On the Rand, practically all the shafts are rectangular in plan. In early days a few vertical circular shafts were sunk to intersect the reef at comparatively shallow depths, but the circular form was never popular, *and has been entirely abandoned for many years.*



On the outcrop mines, the shafts are usually inclined, and follow more or less the angle of dip of the reefs. The inclination is often uniform for the whole depth of the shaft, though there are usually one or two turns. It would not do, however, to follow in detail the eccentricities of the reef, or hoisting could not be carried on at a sufficiently rapid rate. There are generally either one or two shafts on a mine, according to its area. Usually the shafts on an outcrop mine have three compartments—two for hoisting and the third for a ladderway, pumps, pipes carrying compressed air, and electric cables. The size may be some 16 feet by 6 feet, the long axis being parallel to the strike of the reefs.

In the case of the first row of deep level mines, the shafts are sunk vertically to the reefs, and then turned into incline shafts, a curve of large radius being put in at the bend. They have for the most part been commenced near the outcrop boundary of the mine on which they are situated; the reason for this being that something is saved in the length of the vertical portion of the shaft, and that development and consequently milling can be commenced at an earlier date than would be the case if they had been located near the dip boundary. These shafts mostly have three compartments, though some have five, comprising four compartments for hoisting and one for ladders and pumps.

In the case of mines where the reef occurs at greater depths, the cost of shaft sinking is so great that it is necessary to sink very large shafts, and to make a single shaft serve a greater area than has been usual with shallower properties. As an example the Driefontein Deep may be mentioned. The area is 255 claims, and a single shaft is being sunk. Its dimensions inside timbers are 38 feet by 6 feet, and it has seven compartments, six of which are for hoisting. The long axis of the shaft is across the strike of the strata, as it is not intended to turn it when the reef is reached. The depth at which the reef will be struck is estimated at about 3,900 feet.

The deepest shaft on the Rand at the present time is the Catlin Shaft on the Jupiter Mine. It has a depth of

4,010 feet. There are several shafts approaching 3,000 feet in depth.

Shafts are sunk by both hand and machine drilling, the difference in speed being comparatively little. Hand drilling is more usually employed. The explosive used is blasting gelatine, the strongest available. It is a compound of nitro-glycerine and gun cotton. The speed of sinking varies; 100 feet per month is fairly good work, but 150 feet has been regularly attained, and even 200 feet has been sunk



MACHINE DRILLING IN A GOLD MINE.

for an odd month or two. Shafts on the Rand do not require to be supported for more than from 150 feet to 250 feet in depth from the surface. Frames of timber, 5 to 6 feet apart, are generally employed with close-set lagging boards behind them to the depth for which the support is necessary. Below this depth frames without lagging boards are often put in, though sometimes only dividing timbers hitched into the rock are used, to support the guides for the *skips*.

*Cross-cuts, Levels and Winzes.*—Seeing that the incline shafts are not as a rule exactly in the plane of either of the reefs worked, or, if in the plane of one reef, possibly at some distance from the plane of the other reef, it is evidently necessary to put in cross drives. These are always at right angles to the strike of the reef, thus insuring that they are of minimum length; they are designated cross-cuts. Cross-cuts are also driven to recover the reef after it has been faulted. Whilst cross-cuts are driven straight, levels follow the windings of the reef. They are usually about 7 feet high by 5 feet wide. Winzes are generally sunk from one level to within say 50 feet of the level below; the connection being completed by rising from the level below as soon as it has been driven under the winze. Small air-driven winches are used to hoist the rock out of winzes as they are being sunk.

Cross-cuts and levels are usually driven by means of machine drills, for though this method is a little more expensive than hand drilling, it is very much quicker, and and as a rule speed in development work is an important consideration. Winzes are usually sunk by hand drilling. The usual rate of speed at which levels are driven is some 80 to 100 feet per month, while winzes are sunk at the rate of 30 to 60 feet per month.

*Stoping.*—When a reef has been cut into panels by levels and winzes, the next question is stoping. In stoping a continuous working face is opened from one level to another, and the panel is swept out in the direction of the strike of the bed. Pillars are usually left at intervals in order to support the roof.

Stoping is always commenced from the winzes, and on the Rand it is usual to commence from the upper corners of a panel, the working face not being directly along the dip, but at an angle to it. Stoping may be carried on by machine drilling or by hand drilling. The latter is usually the most satisfactory method, except when the stopes are large, though machine drilling requires less labour. In hand drilling the face of the stope is arranged in steps in order that the explosive may be more effective in blasting

than would otherwise be the case. To look down a long hand-stope, where perhaps 20 natives are drilling at one face, is a most interesting sight. The natives strike their drills simultaneously with rhythmical regularity, and often accompany their work by singing. Each worker has a candle to throw light on his drill, but this feeble glimmer only partially lights the human hive; and, as the natives are almost naked, the scene produces a weird and mysterious effect on the observer.



TIMBERED STOPE, DURBAN ROODEPOORT DEEP.

For the most part the explosive used in stoping is gelignite, a weaker explosive than that used in development work. About half a ton of rock per shift is broken by each native drilling, whilst each machine drill breaks from 7 to 12 tons of rock per shift.

The size of stopes varies from 20 inches to 12 or 14 feet. Invariably a certain amount of waste rock is broken *with the banket*, but this is to some extent sorted out at *the surface before the rock is crushed.*

*Faults and Dykes.*—Faults and dykes are the causes of considerable inconvenience and additional expense in mining operations on the Rand. Occasionally the Reef is duplicated over a small area, but more usually there is some loss of reef, and both development work and stoping are more costly when faults and dykes are numerous.

*Transport.*—After the ore has been broken in a stope, it has to be got down to the level below. When the reef is steep this is an easy matter, but when the reef is flat and



the footwall is rough the ore has to be laboriously shovelled down. In order to reduce the expense of this shovelling and also to reduce the large number of boys required, Rand engineers have been exercising their ingenuity for the last two or three years in designing stope conveyors, several varieties of which are now in successful operation.

When the ore arrives at the level it is delivered into waggons by means of small shoots. Usually 16 cubic foot waggons are used, and they are pushed along the levels by natives. This is a somewhat primitive method of transport.

but the crookedness of the levels prevents mechanical haulage being employed. However, there is no doubt but that some cheaper and more effective method of transport underground will be introduced for the larger deep level properties, where, as already explained, the shafts are laid out to serve larger areas. On arrival at the shaft the ore is tipped into bins, which usually hold a considerable quantity of ore, perhaps a hundred tons. On the top of the bins are grizzlies made of steel rails. These are some nine inches apart, and they prevent very large pieces of rock being put into the bins. From the bins the ore is run directly into the skips which convey it up the shaft.

*Drainage and Ventilation.*—The keeping of the mines clear of water is for the most part a very simple problem, as they are not heavily watered. Only one mine has hitherto met with any considerable stream, and there two and a half million gallons per day has to be dealt with. Usually the quantity is some 100,000 gallons per day. The pumps used are described in the section on Mechanical Engineering.

At both the eastern and western extremities of the Rand—that is, on Klipfontein and on Gembokfontein—the reefs run under dolomite, which is known to contain very large quantities of water, so that Rand engineers will probably have a new problem to deal with in this direction before long.

Ventilation is naturally a problem of very great importance, though it is doubtful whether its economic significance is always quite as clearly recognised as its humanitarian aspect. Only in a few cases have artificial means of ventilation been necessary. For the most part, adjoining mines communicate with each other, and a good current of air flows through the principal passages of a mine. The difficulty is rather in the direction of ventilating the development drives as they are being driven, and before communicating winzes have been completed. It may fairly be said that much more attention is paid to this subject, and that conditions are much better than they were before the war period.



THE SURFACE BUILDINGS OF A GOLD MINE.

### III.—Mechanical Engineering (Mine to Mill).

The rock on being brought to the surface is automatically tipped on to "grizzlies" placed over bins constructed in the headgear. The headgears erected a few years ago were large timber structures of about 60 to 70 feet in height, which not only provided for the hoisting and tipping operations and for large bin storage, but also for the preliminary



WOODEN HEADGEAR (OLD STYLE).

rock-breaking and sorting. In these headgears the coarse rock from the bottom of the "grizzlies" is conducted through a washing trommel to a sorting table or belt, where the waste rock is picked out by hand, and passed to a waste bin to be conveyed away to the dump along an elevated tramway. The pay rock is automatically conveyed to rock breakers of either the rotary or reciprocating type,

this preliminary crushing being in many cases conducted with machines in series, so that the mine rock (of maximum size 8 inches) is reduced first to 4 or 5 inch size, and then to  $1\frac{1}{2}$  inch, at which latter size it is passed to the mill with the fines. The rock requires to be elevated again to undergo a second crushing, as there is not sufficient height in the headgear to allow of distribution by gravity. In cases where the crusher house is not part of the headgear, this latter is only about 30 feet high, and the coarse and medium rock is conveyed, generally by mechanical haulage, to another station, where, after elevation, the sorting and crushing operations are effected.



For transporting and raising the ore and waste as necessary during operations on the surface, the old time combination of truck haulage and mechanical vertical lift has been superseded in the more modern plants to a great extent by the adoption of the belt conveyor. A recent and very satisfactory innovation as an adjunct to the belt conveyor is the automatic weighing machine which accurately records the weight of material transported.

The modern headgear is constructed of steel and is from 100 to 125 feet in height. This construction, though slightly more expensive in first cost, is of greater permanence than that of timber, and the fire risk, which of late has proved to be no slight one, is minimised. The crusher house in these cases is built on to the headgear as an annexe, and in its construction timber is dispensed with as far as



IRON HEADGEAR (NEW STYLE).

possible. It has been found that the height of 125 feet is necessary in the headgear in order to provide suitable clearance between the tip and the sheaves, and also the head necessary for gravity distribution through the two stage crushing and sorting. A further elevation by conveyor belt is then required to deliver the ore into the bins in the battery. Arrangements are made so far automatic that the ore after arrival at the surface has not to be handled except during the sorting process. On the Rand there is no natural power available, and the power necessary for driving the machinery, of aggregate h.p. about 170,000, is generated

primarily in steam boilers, numbering about 1,800. The large proportion of the plant is driven directly by steam engines, but considerable use is made of electrical and compressed air power distribution. The latter is used chiefly for rock drills, and for pumps and hoists to a lesser degree, while the former is utilised for such services as lighting, pumping and hoisting, reduction plant and surface transport. Quite recently the project of including the large steady load of the stamp mill in the electric drive has received much attention, and examples of this practice will not be much longer absent. In the case of a 200-stamp installation for a moderately deep-level mine, there will be probably a total average power demand of about 2,000 h.p. made up of 750 h.p. for air compressors, 650 h.p. for mill, 200 h.p. for winding engines, 130 h.p. for pumping (at the rate of 200,000 gallons per 24 hours from a mine of moderate depth), and the remainder for surface work outside the battery.

Although the total power load will probably never exceed 2,500 h.p., yet it will be found that the aggregate horse power of prime movers erected will be about 4,000, spares having to be provided generally to allow of absolutely continuous work in spite of any breakdown in the machinery. This practice, by which each separate mine has been put to the expense of maintaining a large prime mover reserve, has been a great argument in favour of the combining of three or four mines for joint working with one central power station. At the East Rand Proprietary Mines this innovation is being introduced, and both electric power and compressed air are to be supplied from a central station to two or more mines of the group.

The boilers used on these fields are of great variety, externally fired, Lancashire and Cornish, dryback, loco. type and water tube. The latter class of boiler is in great favour, and appears to be rivalling the externally fired boiler in popularity, while the Lancashire boiler still finds many adherents.

The engines used for winding are invariably of the horizontal type, and built twin, so that a pair of cylinders *operate on cranks at opposite ends of a shaft to which a*

pair of drums are connected by clutches. For outcrop mines, and also for sinking operations, the geared hoist has proved itself satisfactory, but the necessity for higher speeds of winding has produced the direct acting winder. The engines of these are generally compound, and the cylinders are arranged either cross-compound or twin-tandem. The valves of these engines are generally positively driven, either Corliss or double beat. Trip gear is provided on many of the big hoisting engines, but in some of these



AIR-DRIVEN WINCH, NOURSE DEEP GOLD MINE.

cases it is not used, although supplied, the trip rods being removed and the valves directly connected. Cylindro-conical drums are coming into use for deep-level winders, and three examples may be seen at the East Rand, the winding engines being cross-compound, with cylinders 30 inch and 48 inch x 5-ft. stroke, and the drums 20 ft. in diameter tapering to 12 ft. The Whiting hoist is another popular style of winder. This is a sheave-driven hoist, the rope winding round a pair of sheaves fitted with "Walker"

rings. The description of the Rand mines standard Whiting hoist is as follows:—Sheaves, 12 feet diameter, driven from a twin-tandem compound condensing engine. H.P. Cylinders, 17 inches diameter, and L.P. Cylinders, 28 inches; stroke, 5 feet. For sinking operations the sheaves are replaced by tandem parallel drums. The maximum speed of hoisting is about 4,000 feet per minute, but most winding plants are worked at a much slower speed.

The most common practice in the past was to install the mill engine as the main power engine. Besides operating the shafting for the battery, dynamos, mechanical haulage, crushers, etc., were driven off it by means of belts, friction clutches being generally preferred for connecting up these auxiliaries. A stand-by engine was provided, capable of doing all, or a large portion of, the same work. These engines were generally of the horizontal compound type, fitted with Corliss valve gear. The horse-power of the main engine ranged from about 300 in the case of a 60-stamp battery to 800 or 1,000 for one of 200 stamps, the excess of power being available for other work than the mill. About the years 1895 to 1897, it became the fashion to erect vertical engines for this work, but this class of engine has not generally proved satisfactory, and the horizontal type is now again the more popular for the mill. At the present time the advantages of electrical power distribution being thoroughly recognised, it is usual in the design of a new plant to install the mill engine solely for the purpose of driving the stamp batteries, and to generate electric power by separate prime movers for use in the auxiliary plant. Each dynamo is driven by its own independent engine, and motors are installed for driving ore-breakers, sorting tables, tailings wheels, pumps, belt conveyors, mechanical haulage, etc.

*Air Compressors.*—These are for the most part of the horizontal two-stage compression type, with mechanically-operated valves, driven direct from cross-compound condensing engines, high pressure air by high pressure steam, and low by low, a cooler being supplied to reduce the temperature of the air after the first stage compression. A *very generally* used machine, suitable for 35 drills, has

steam cylinders of 20 and 34 inches diameter, air cylinders of 20 and 33 inches diameter, 48 inch stroke, to be run at 68 r.p.m., the i.h.p. required being about 450. Latterly the units have increased in size, and compressors up to 75-drill capacity are being erected, this size requiring about 900 i.h.p. Vertical compressors have been installed in a few instances, but this type is not generally favoured by engineers. The number of air compressors erected is 152. These serve to transmit power underground in about 100 mines, the total i.h.p. being 48,373. The air leaves the compressors at a temperature of about 300 degrees F., and at a maximum pressure of 80 lbs., the average attained being about 75 lbs. Where, however, the compressors are overloaded with drills, much lower pressures obtain with consequent decreased efficiency. The air is transmitted down the mine through a steel pipe line, the usual allowance of sectional area being one square inch per drill. For drill work, reheating is not resorted to, but this practice has been adopted where the compressed air is used for driving pumps or hoists.

*Electrical Power.*—The uses of electric power in mining operations have already been stated. These are continually expanding, the only check being a certain want of confidence created by the lack of agreement among electrical engineers as to the most suitable sizes of power units, the most preferable voltages, cycles, etc.

Most of the mines using electricity have their own generating plants, but several are supplied with current by power companies. In a few other cases current is supplied to one mine by another mine of the same financial group, and this practice of the centralization of power plant is on the increase. The present tendency is all in favour of the three phase system, and although the fullest advantage cannot be taken of its economies in the limited distribution area of a mine, or even of a small group of mines, the flexibility of the system made possible by the ready transformation of the current makes it more economical and satisfactory generally for motors for mining work. With regard to the direct current plants on the mines, many of these are obsolete in pattern, and on several mines there

is a very varied assortment of machines, showing differences in voltages, winding, etc., which make the plant as a whole most inefficient.

*Mine Drainage and Water Supply.*—For the main pumps in mines with shafts not exceeding 1,500 feet in depth, the Cornish pump is most in favour, 42·5 % of the water discharged last year from the gold mines on the Rand was dealt with by this class of pump. Electrically driven pumps come next in order of preference with 38 %. These



A MILE WIDE MINE RESERVOIR.

pumps are generally 3-throw geared, single acting. About 1 % (119,000 gallons per 24 hours) was brought to the surface at the Rietfontein "A" Mine by means of a pump driven by hydraulic power. The remaining 18·5 % of the water discharged from the gold mines was lifted by direct driven pumps (generally double acting) actuated by steam or air, or by bailing tanks. The pumps used for *mine drainage* are nearly all of the reciprocating type, *single or double acting*, and in general fitted with ordinary

self acting valves. In a few cases the Reidler or somewhat similar valve system is in use and full advantage is taken of its suitability for high lift,—one pump delivering to the surface against a head of 1,220 feet. As a general rule, however, stage pumping prevails and lifts varying from 100 feet to 600 feet are adopted. For the “feeder” pumps compressed air is generally used, but the use of motors is extending. The amount of water usually raised to the surface from each mine is about 100,000 gallons per 24 hours, but a few have to deal with from four to six times this amount, while in the case of one very wet mine about two and a half million gallons per 24 hours have to be pumped out. The water pumped from the mines is usually employed in connection with the ore reduction plant on the surface. In some cases the quantity raised suffices and any further supply from other sources is unnecessary. The water is generally slightly acid, and not suitable for boiler feed unless chemically treated. A further supply of water for the mines is obtained by the conservation of rain water draining naturally into reservoirs, dams, pans, or wells. The total storage capacity of dams and reservoirs amount to over four thousand million gallons, and the quantity actually stored in them on June 30, 1904 was 3,607,243,300 gallons, while a further amount of 470,745,500 gallons was stored in pans and wells. The water requirements of the mining industry may be stated as the amount required as “make up” per 24 hours per stamp. Taking an average throughout the mines, this appears to be 1,870 gallons for mill and 434 gallons for boilers. The demand may also be expressed as 380 gallons for mill and 89 gallons for boilers per ton of rock crushed under present prevailing circumstances. The commercial value of water, delivered on the mines in bulk, is about half a crown per 1,000 gallons. J. A. V.

#### IV.—Metallurgical.

The main contribution that Johannesburg has made to the industrial advancement of the world is the successful application on a huge scale of the cyanide process for the extraction of gold. In fact, metallurgy in South Africa is practically covered by the cyanide process. We have visions of a metallurgical city, where copper, lead and zinc, and even tin, will play important parts, but as yet the base metals in South Africa count for little.



FURNACES FOR ROASTING ORE, ROBINSON DEEP.

There is not much novelty in our mining methods, which are to a great extent applications of principles practised in the United States, Australia and other mining countries. But in metallurgy, the pioneers of the industry took up a process which was under a cloud, having been all but abandoned in the United States.

*The action of potassium cyanide on gold has been known for a long time. Faraday was well aware of it, but the first*



patent for the extraction of gold by the use of KCN (*Potassium Cyanide*) was taken out by J. H. Rae, in the United States in 1867. Some advance was made by J. W. Simpson in his patent of 1885, and although efforts were made to apply the process on a working scale, little was accomplished.

The names of J. S. M'Arthur and R. Forrest and W. Forrest, of Glasgow, will always be associated with the successful working out of the cyanide process.

The cyanide process has to a large extent been the making of the Rand. Had it proved a failure, instead of the numerous smoke stacks one sees to-day, there would probably have been a small mining camp, with mines on the rich sections of the Central Rand. The cyanide process has made possible most of the mines of the Witwatersrand.

The rival process, by chlorination, has almost ceased on the Rand. There are only two plants of any consequence in existence to-day, one at the Robinson Mine, the other at the Transvaal Chemical Works.

There are several reasons why cyaniding has ousted chlorination. In the first place, roasting of the ore is essential to chlorination but not to cyaniding. No silver is extracted from ore in the chlorination process, but the cyanide process enables a fair amount of it to be produced.

The conspicuous success of the cyanide process is due to the amenability of the ore. If the auriferous rock had been made to order, it could not have shown better results, for it offers no metallurgical complications. Had it done so, the indefatigable labours of the pioneer chemists and engineers would have overcome all obstacles. Hennen Jennings, who gave some of the best years of his life to the reef, John R. Williams, who did much to perfect the decantation of slimes, Von Gernet, Bettel, Butters and others, will long be gratefully remembered.

We will now conduct our distinguished guests over a gold mine. No line can be drawn between its different branches. The mechanical processes overlap the mining work, and mining is overlapped by chemistry. The metallurgical part commences in the mine itself, in places

called stopes, where the ore is broken. In a mine where gold-bearing strata are only one inch thick, it is important that as little as possible of waste rock should be broken, for this waste rock greatly lowers the value per ton of the ore. Consequently, the stopes should be kept as narrow as possible. Therefore, waste rock has to be sorted out. From a mining point of view, it would be easier to widen the stopes, but this course would be bad from the metallurgical standpoint.

In order to keep the stopes narrow, hand labour is essential. On some mines the margin between profit and loss lies in this "indirect sorting in stopes." If hand labour is used to break the rock, narrow stopes are possible, and the proposition is a payable one. If, through lack of labour, rock drills are used in the stopes, they must be widened, and when a mine has shallow deposits, these wide stopes, with the extra waste rock, may spell ruin for its shareholders.

Another instance of how mining overlaps metallurgy is in the explosives used for breaking the rock. If a powerful explosive, such as gelatine be used, a large percentage of the ore is converted into powder, which it is impossible to sort. For this reason it is often preferable to employ a milder explosive, to break the rock into "sortable" sizes.

At the shafts there is a simple device for dividing the ore from the mine into three classes, coarse, made up of rocks from 3 inches upwards; medium, rock from 3 inches to 1 inch; fine, rock from 1 inch in size to powder. The device is known as a grizzly, a strong grating of flat iron bars, placed edgewise, the apertures being from 1 inch to 2 inches, and the angle of inclination about 50°.

The coarse rock is hauled to one bin of the sorting house, the medium to another, and the fine material is dumped into a bin from which it is taken direct to the mill.

Several methods are used for getting the ore from the shafts to the sorting houses. Mule power is employed in one or two cases; but endless ropes, or electrical and steam locomotive haulage, are the principal methods. Belt conveyors are also used.

Three methods are adopted in sorting houses. The primitive method of spreading the ore to be sorted on a floor and washing it with a hose held by a Kaffir, as introduced by J. Harry Johns, is still practised on the Ferreira Mine. It has some advantages over later methods. Complete sorting is possible, the material remaining on the floor until all the waste rock is picked out. A great drawback to this method is the number of Kaffirs required for sorting. At the Ferreira, 115 Kaffirs are employed in the



THE QUARRY SLOPE, ROSE DEEP.

work, whereas with other methods 38 Kaffirs would be sufficient. When labourers are scarce, the number employed in the sorting houses is a consideration.

As a labour-saving device circular tables were therefore introduced. The ore (save the "fines," which go direct to the mill) falls on to the table and is thoroughly washed, in order to allow the sorters to distinguish between reef and waste. The table revolves and the sorters pick out the waste rock, throwing it into a waste bin. Finally, the

sorted material, considerably enriched by the removal of the barren rock, falls into a large crusher, where the ore is crushed small before going to the stamp battery.

Another sorting method is to employ endless belts in place of circular tables, the sorters standing on each side of the belt and picking off the waste rock as the belt moves. Of late, belts have become quite common on the Rand.

Sorting the ore is a very important part of the metallurgical operation. If it is carelessly done, pieces of reef are thrown into the waste bin and the gold lost. An assay of the waste rock leaving the sorting house is made periodically to see if gold-bearing reef is being thrown away. Chinese make very good sorters when properly supervised.

The questions of sorting or not sorting and what percentage to sort, have often been before the local scientific societies. The general opinion seems to be that there are times when more money can be made by sorting less. For instance, a 200-stamp mill may not have sufficient labour for more than 80 stamps. If sorting is used, the material thrown away as waste may contain enough gold to produce a profit of 6d. per ton. In other words, when a mine has idle stamps, it is better to keep a few more stamps at work on lower grade material, provided any clear profit can be made by crushing the extra rock.

On the other hand, suppose the mine has an abundant labour supply, and the mill bins are kept filled, then it is preferable to sort as closely as possible, even if the material thrown away shows a slight profit, for this material "stands in the way of" stuff of far higher grade.

Such things as iron bars, pieces of wood, candles, bits of dynamite, etc., are picked out by the sorters, for, should they get into the mill, they cause much trouble.

The waste water from the sorting plant carries off material in suspension, which contains gold. For this reason, all the wash water from the tables flows to settling pits. To aid settlement and to counteract the acidity of the material, it is well to feed lime into these pits. The overflow water from these pits carries a fine slime with gold in it. This slime is run direct to the cyanide plant. *The sediment from the pits is sent to the mill.*

Three methods are in use for getting the sorted ore from the sorting station to the bins in the stamp battery, namely, by a large self-dumping skip, by endless rope haulage, and by endless belt conveyors.

Having delivered the ore from the mine to the stamp battery, let us take a bit of it for examination. We grind our sample to a fine powder ready for panning. Panning is an art of the prospector, whereby the light, almost barren material is carefully washed away, the gold remaining with the heavy particles in the bottom of the pan.



CHLORINATION PROCESS PITS, ROBINSON DEEP.

On looking at our washed sample in the pan, we find the colour that makes most eyes glisten, tiny specks of yellow gold. You wonder that in the rock no traces of gold could be seen. This is a peculiarity of the Witwatersrand reef. Specimens containing visible gold are found, but they are distinctly exceptional. Sometimes the reef assays 20 to 30 ozs. per ton, and yet with the naked eye none of the precious metal can be seen. The reason for this is that the gold occurs in extremely fine grains.

Placing a bit of mercury, or better still, a small piece of sodium amalgam in the pan, and rubbing it gently amongst the material, all the tiny grains are taken up, and we look in vain for traces of gold in the washed material.

And here on a small scale we get an illustration of the metallurgy of the Rand. The tiny bits of gold obtained in the pan are called "free" gold. This is readily taken up by mercury and that is the medium whereby "free" gold is caught in the mills.



DETAILS OF BATTERY STAMPS (5 TO EACH PLATE).

Although the eye cannot see it, assaying shows us that an appreciable and payable quantity of gold remains in the material left in the pan, even after the stuff has been completely treated with mercury. This gold is called "bound" gold, and it is impossible to extract it in the mill by amalgamation in the ordinary way.

The "bound" gold in the Witwatersrand reef is not a *chemical compound* but simply gold hidden away in the *recesses of the cubical pyrites*. Mercury fails to lay hold

of this "bound" gold, but potassium cyanide follows it into the cube.

Examination with a microscope of a piece of the pyrites after cyanide treatment, shows that the iron pyrites cubes have numerous little holes in them, corkscrew fashion. These holes are made by the cyanide solution dissolving out the gold, following it into the interior of the cube, with an avidity for the gold and a disregard of the base metal that would do credit to a miser. If the cube be too large, the solution cannot penetrate to its centre and dissolve out the gold hidden there.

It is for this reason that finer crushing is resorted to by means of stamps or by the later means of tube mills. The stamp mill has not attained its eminent position without competition. "Dry crushing" has been practised; it has not only proved a failure, but has closed down mines, which, with the stamp battery, might have proved successful. Steam stamps have also been tried and some think there is a future for them on the Rand.

Visitors to a gold mine battery will notice the simple but ingenious manner in which the stamps are lifted up, and the weight allowed to fall by gravity on to the ore in the mortar box below, crushing it to a fine sand. The method of automatically feeding the ore into the boxes will also catch the eye. Water runs into the box and there is a splash, splash, splash of crushed material and water falling from the screen and rolling over copper plates covered with mercury. As the material runs down the slightly inclined plates, the mercury greedily grabs the pieces of "free" gold and forms an amalgam.

At the bottom of the plates there is a launder or trough, which carries the material away to the cyanide works.

Before leaving the battery let us note a few things. The men you see scrubbing the plates are performing an operation known as "dressing" the plates. Each plate is "dressed" every four hours. "Dressing" is simply preparing the surface of the copper with mercury, to catch the gold.

Once every twenty-four hours the plates are scraped, that is, the amalgam is taken off. The "black sand" is

also collected from the plates at this time. The amalgam from the plates is subjected to a process known as "squeezing," by placing the amalgam in a canvas cloth, and squeezing out the excess of mercury, either by hand or with a machine. After squeezing, the amalgam is a hard ball, containing about 30 per cent. of gold and 70 per cent. of mercury. About 25 per cent. of the gold from the mill



COPPER PLATES AT THE CROWN DEEP GOLD MINE.

is obtained from black sand. To extract the gold from the black sand, it is thoroughly roasted and then ground in a barrel with mercury. We will leave the amalgam in the mill manager's hands for the time being, and see later on what becomes of it.

All the gold on the copper plates is not taken off by *scraping*. Some of the amalgam is absorbed by the copper. *In order to obtain this amalgam, the plates are subjected to*



"steaming" every three or four months. Even then the copper plates retain gold. When these plates are worn out, they are specially treated for the gold. By using plates made of muntz metal, the absorption of gold in the form of amalgam is almost done away with. As yet, muntz metal plates are not common on the Rand.

Gold is as elusive as the will-o'-the-wisp and has the faculty of getting into places where it is not wanted. In spite of all care, pieces of amalgam get detached from the plates and fall into the launders, and if no means were taken to catch this, it would find its way to the cyanide works, where only a small percentage of the gold would be won. To catch this amalgam, traps are put in below the plates: but even with traps, a considerable amount gets away.

To reduce the loss to a minimum, auxiliary plates have been introduced, first on the Nigel Mine and later on at the Ferreira. At the latter, the plates are given a gentle shake, which adds to their effectiveness as "amalgam catchers." To show that these plates do catch a lot of gold, the figures of the Ferreira Mine for 1904 are interesting. Fifteen plates were working during the year, and 9576 ozs. amalgam, or 2,823 ozs. fine gold, worth £11,856 12s. were recovered. The working expenditure amounted to £1059, showing a profit of £10,797 12s. for 1904.

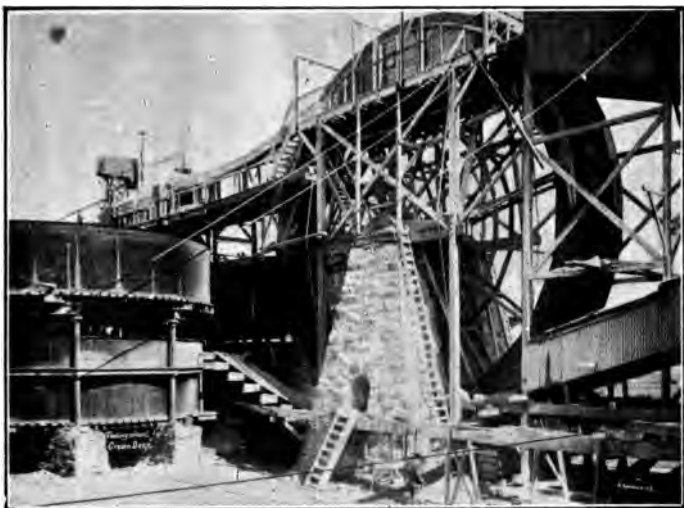
It is essential that the ore be slightly alkaline. To overcome the natural acidity of the material from the mine, lime is freely used. The proper alkalinity of the material is .008. By the use of lime, the amount of gold recovered in the mill is increased.

Frequently through the day a sample of the material falling on the plates is taken. Samples are also taken of the pulp after it has passed over the plates. These samples are carefully assayed for gold every day, and by comparing them, the percentage of gold caught on the plates is rapidly determined.

We will follow the pulp from the mill, down the launder, to the cyanide works. Remember that practically all the free gold is out of the material and that it is the "bound" gold we are after. The first thing that catches the eye is a small automatic lime-feeder, which drops a

small bit of lime into the stream below every few minutes. Care is taken not to add too much lime here.

The tailings wheel is one of the most characteristic parts of a Rand cyanide plant. It is a device by which the pulp is elevated and conveyed from the mill into the tanks. A better scheme than these impressive wheels, fifty feet in diameter, for elevating the pulp to the desired height, could not be devised. On some mines, pumps are used for lifting



TAILINGS WHEEL, CROWN DEEP GOLD MINE.

the pulp, but this is a poor method. In one or two cases, it is possible to make use of natural gradients.

Not far from the tailings wheel, visitors will notice a series of v shaped boxes. This apparatus, known as spitzkasten, is used to divide the pulp into three classes for treatment in the cyanide works. The pulp is falling against an upward flow of water, the "head" for the water being obtained by placing a tank of water above the spitzkasten. Naturally, only the heaviest particle can fall through this *upward* stream. These heavy particles run away to a

tank, the balance of the material flowing over the spitzkasten. The heavy stuff is called "concentrates."

The other material passes on through the spitzkasten to a separate tank. There are two ways of distributing the material in the tanks, by means of the Butters-Mein distributor, or by a man with a hose. As a rule, the hose method is employed.

It sounds very simple to say that the stuff from the spitzkasten is allowed to settle in a tank, but if this operation be done carelessly, much trouble and loss is experienced.



THE SLIMES WORKS, CROWN DEEP GOLD MINE

If the hose is not manipulated properly and the overflow gates looked after, slime settles in the tank with the sand. This slime is almost impervious, and if left in the sand tank, the amount of gold extracted from it is small, and worse still, the slime retains as moisture a large percentage of the rich cyanide solution. Care must be taken, therefore, to get the slime out of the tank to the slime plant.

Let us return to the tank containing concentrates. This material is the richest treated in the cyanide works, the average value along the Rand being about 12 dwts. It

takes about twenty days to finish the treatment of a tank of concentrates. Above this time, no matter how long the treatment is extended, little or no extra gold is extracted. The solution has remained in contact with concentrates during the period of the war, yet at the end of that time no more gold was extracted than is obtained after twenty-four or twenty-five hours' treatment.

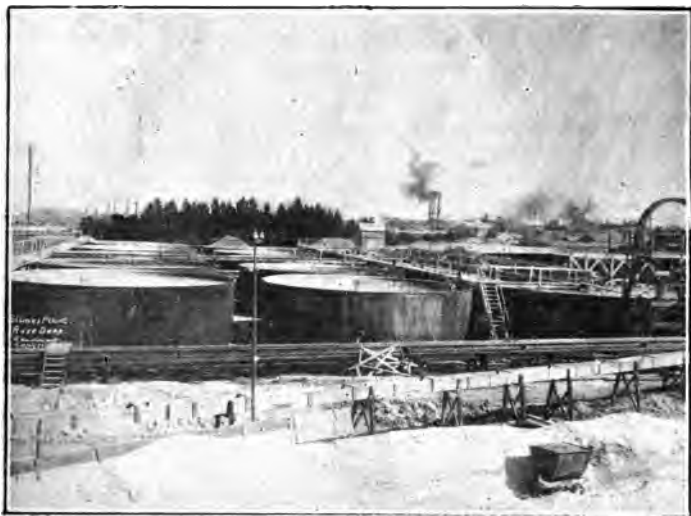
The value of the concentrates thrown away assays from  $1\frac{1}{2}$  to 2 dwts. In all industrial concerns, the material thrown away must be closely studied, so that waste can be brought to an absolute minimum. Engineers have made a careful study of this discarded material known as "tailings." Almost all of the gold lost in tailings is found in one class of the material, the concentrates. The silicious material carries off very little gold.

It is obvious that if the gold in the concentrates could be more completely extracted, the waste gold in tailings could be brought down to 4 or 5 per cent., whereas at present it is from 10 to 15 per cent.

To solve this problem, the use of tube mills has been recommended. By the introduction of tube mills we are promised, not only a higher extraction, but a far greater crushing capacity in the mill, by being able to use a much coarser screen. Only the rich material, the concentrates, should be reground in the tube mill. The main object is to break up the cubical pyrites in which the gold is "bound," by sliming the product, so that the gold may be more completely extracted by further amalgamation and cyaniding.

There is no need to follow the treatment of the concentrates in the tank through all the days. Suffice it to say that the plan is to pump cyanide solution on the top of the concentrates, let it drain through to extract the gold, and then allow it to run by gravity to the Extractor house, where the gold in solution is precipitated on zinc shavings. The highest strength of solution is used for concentrates, namely .3. This .3 does not mean that in 100 lbs. of water there is 30 lbs of K C.N. It is an abbreviation of " $\frac{3}{10}$  of 1%," so that in every 100 lbs. of *water*, there is three-tenths of a pound of *potassinm cyanide*.

We will pass now to the tank containing the second product from the spitzkasten, the "sands." The treatment is practically the same as for concentrates, except that only six days are required instead of twenty. As we contemplate one of these huge tanks, containing four hundred tons of sand, we are impressed by the game of "hide and seek" which goes on when the cyanide solution is pumped on the material. The sand assays about 4 dwts. to the ton, so that in a tank there are, roughly, 80 ozs. of gold, spread all



SLIMES PLANT, ROSE DEEP MINE.

through the material, in tiny specks, securely hidden in the recesses of the pyrites. The cyanide solution is pumped on, and seeks out the infinitesimal pieces of gold so successfully, that after its search only 10 per cent. or so remains in the sand.

When the treatment is over, the sand is ready for discharge. This is done by opening the doors at the bottom of the tank, filling the sand into cars and removing the trucks by endless rope haulage to the tailings heap, a

landmark that the visitor will pronounce characteristic of Johannesburg. (*See page 215.*)

We may now follow the cyanide solution, carrying the gold from the tanks to the extractor house, where the gold is precipitated; or go direct to the slime plant where the third product of the pulp from the mill is treated.

Slime is an impalpable powder formed by pounding the auriferous rock. When dry, it is as light as a feather and will float a long time before settling. When wet, it forms an impervious, sticky mud. Naturally, such a product requires different treatment from concentrates and sands. In the Rand's early days this slime problem was not attacked, but the slime was stored in dams as a practically hopeless material. Thanks to the efforts of John R. Williams, in conjunction with Hennen Jennings, to C. Butters, Von Gernet and others, the decantation process for the treatment of slime was worked out and perfected, so that to-day scarcely a mine on the Rand is without a slime plant. From a material which used to be considered hopeless, mines on the Rand are now making profits ranging from £1,000 to £3,000 per month.

Adverse critics have railed at the decantation process as crude and expensive, and have suggested filter pressing. The following returns for the month of April of a large group, treating nearly 50,000 tons of slime per month, are instructive:—

Value of slime before treatment, 2·177 dwts.; value of slime after treatment, ·470 dwts.; theoretical extraction, 78·398%; actual extraction, 81·778%; value of fine gold, £17,961·48; cost per ton treated, 2/2·364; total profit, £12,673·28; profit per ton treated, 5/3·183.

In one case, the cost to treat a ton of slime was 1/5·092. A process that can show such low working costs is neither crude nor expensive, and any new slime process will have difficulty in ousting the decantation method.

Lime is freely used in the treatment of slime to cause the rapid settlement of the flocculent material, which otherwise would float for a long time. The amount of slime taken for a charge varies with the size of the tank, and whether an agitating gear is used. With small tanks the

charge is about 40 to 50 tons, whereas with large tanks the charge is from 100 to 120 tons.

The tanks in a slime plant are of two kinds, receiving tanks and treatment tanks. The slime runs into one of these, and the water is decanted off. The slime is then pumped with a weak cyanide solution into another tank. After settlement, the gold-bearing cyanide solution is also decanted off carefully into a large receiver, from which it



TREATMENT TANKS AT THE CROWN DEEP MINE.

flows by gravity through zinc boxes in the extractor house where the gold is precipitated.

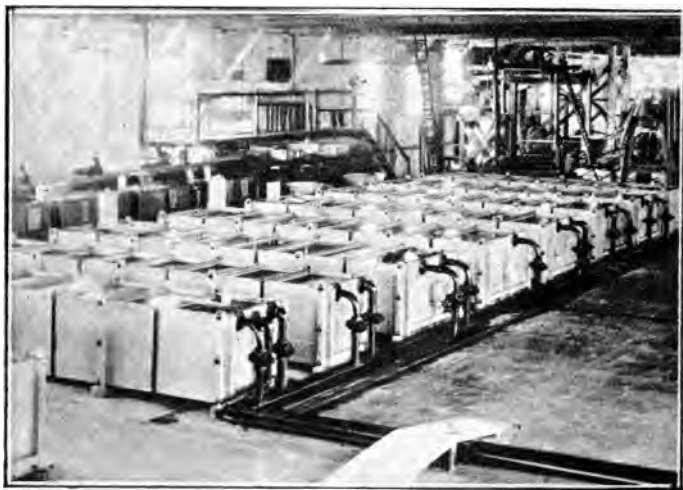
The remaining slime is again treated with cyanide solution, to extract more gold, and is then discharged.

Before entering the extractor house, we take a glance back at the super-imposed tanks, where the concentrates and sands are treated. The top tank is simply used for

receiving the sand. No treatment with solution goes on in the top tank. When it is full, the solution is lowered to the bottom tank, where the sand is treated.

In the extractor house we notice a number of small iron tanks called receivers. There are generally three of them. The gold-bearing solutions flow to these receivers from the tanks.

Then we note a number of large wooden boxes. The gold-bearing solutions flow through these boxes, the gold



ZINC SHAVING BOXES, CROWN DEEP MINE.

being precipitated on to zinc shavings. Innumerable little hydrogen bubbles float to the top of the solution. The stone jar standing at the head of the box contains a solution of acetate of lead. The solution gets into the box, drop by drop, and helps precipitation. Before the war, an electrical method was used for precipitating gold from the slime plant solutions. It was the method of Siemens and Halske. This process has now entirely disappeared from the Rand.

In the large cyanide plants, the zinc boxes are cleared *up three times* a month; that is to say, a black slime con-



taining the gold is taken from the bottom of the boxes. This material is placed in a large wooden tank in a corner of the extractor house, where it is treated with sulphuric acid to get rid of the zinc, etc. The residue left in the wooden tank is then pumped through a filter press, the liquid running away, while the black slimy material remains behind in the press. When the press is opened, we find some black cakes, containing about 50 per cent. gold.

The best method of getting the gold from these "cakes" has been a question much discussed. The old style was to flux the material and then smelt in plumbago crucibles. Gold in the form of a button of 50 ozs. or so was found at the bottom of each crucible, after the molten refuse was poured off. These buttons were eventually melted together and then run into a mould.

The bar of gold so obtained was very base, the bullion assaying from 690 to 735 fine gold. London refiners charged extortionately for refining this material.

There is great improvement now in this respect. Gold from the cyanide works now assays 870. Some people have a mania for getting the gold extra fine, over 900. This mania can be carried too far, for there is a danger of losing silver.

The old method of smelting has its shortcomings. It is expensive and tedious and the loss of gold seems to be high. A large amount of lead gets into the gold buttons. Lead in a gold bar, even in small quantities, is harmful.

A forward step was made by the introduction of clay liners in plumbago pots. This allowed the use of oxidizing agents, such as manganese dioxide and nitre, together with silicate of soda or ordinary sand, for fluxing off a large part of the base metal.

As an improvement on the pot smelting of gold, Mr. Tavenor, then cyanide manager of the Bonanza mine, brought out his process. For a time it was thought that we had struck the ideal method for treating the auriferous material from the cyanide works, but it is generally conceded now that although this new process has some advantages it is by no means perfect.

The general scheme is as follows:—The black cakes

containing the gold are thoroughly mixed with a flux, the principal constituent of which is lead oxide. The fluxed material is then run down in an ordinary pan furnace. When the mass is thoroughly melted, the molten lead at the bottom of the furnace is run into bars called "pigs." This lead contains about 8 per cent. of gold.

To get the gold from the lead, the base bullion is treated in a cupel furnace. The principle is quite simple. A large cupel, carefully prepared from bone ash, is put into the furnace. The pig lead is fed into the cupel, and as the pig melts down, another one is put into the cupel. A gentle blast of air plays on the molten surface, and oxidizes the lead which runs off as litharge through a gate cut in the bone ash, into a receptacle below the cupel. This oxide of lead from the cupel is not lost but ground up and used in the pan furnace at the next smelt.

After all the lead is oxidized, the gold is left in the cupel as a flat cake. This is placed in a plumbago pot, melted and poured into a bar mould. After brushing up and stamping the name of the company on the gold, it is ready for shipment to London or Paris. A sample of the gold is taken for assay.

One great objection to the Travener process is that a good deal of the gold sinks into the bottom of the furnace. On one mine 1,000 ozs. of gold were "tied up" in the bottom of the furnace. On poor mines, where every ounce counts, the management like to feel that they have their hands on every bit of the gold. Of course, this sunken gold is eventually recovered, but the bottom must be torn out of the furnace and the bricks ground up, a tedious and expensive operation.

We have not yet reached finality in extracting the gold from the auriferous material from the cyanide works, but we are still looking for the ideal process.

Before turning our backs on the cyanide works, to walk to the assay office, we take a passing glance at the tailings heap—a huge white monument of sand, the *bête noir* of the inhabitants on a mine during the dusty months of the year. It is satisfactory to note that although a present nuisance, *these tailings* heaps will, in the future, yield profits to the

mines. A process is now under trial by means of which much of the gold thrown away in the tailings and considered lost, will be recovered at a small cost. What percentage of the gold now hidden away in the "dust centres" of Johannesburg will eventually be saved, is not known at present, enough is known, however, to state that many ounces of gold will be recovered in the future from the tailings heaps.

What has become of the amalgam that we left in



"ALPS OF THE RAND." TAILINGS DUMP, CROWN DEEP.

charge of the mill manager, composed of 30 per cent. gold and 70 per cent. mercury? Every day the amalgam obtained is put into the strong room, until 3,000 ozs. to 4,000 ozs. are collected. Then the gold is obtained from it by the process of retorting.

The assayer and mill manager carry out this operation. It is one of the oldest known in metallurgy. The amalgam is placed in iron trays; these trays are put into the retort, a furnace made up of a thick iron cylinder, hermetically closed at one end, with a small opening at the other

through which the fumes of mercury can escape to the condenser behind.

The principle of the operation is very simple. A fire is lighted beneath the retort, and as the heat grows in intensity the mercury rises as a vapour from the amalgam, and passes to the condenser, where the cold water circulating around the condenser causes the mercury to take a liquid form again. The mercury runs out into a large bucket, and is used again in the mill. In about seven or



INGOTS OF GOLD READY FOR SHIPMENT.

eight hours all the mercury is driven out of the amalgam and the gold is left behind, a spongey-looking mass.

When the retort has cooled down, the door is taken off, and the tray containing the gold withdrawn. The "spongey" gold is then put into a plumbago pot, melted and poured into a bar ready for shipment. This pouring of the mill gold is one of the "show" operations, and every visitor to Johannesburg should make an effort to see it.

*The object of this chapter was to impress on our*

visitors what the cyanide process has accomplished for the Transvaal. When summing up the forces that have helped on the progress of this country, the future historian should give due prominence to the share taken by this chemical process.

T. L. C.

### V.—Labour.

These fields have always suffered from the fact that they are located in a sparsely populated country, and consequently they have no reservoir of labour from which their requirements can be drawn.

Although the native races have increased and multiplied under British protection, and have shown a capacity of surviving even the vices of the white man, they are not sufficiently numerous to provide an adequate labour supply; but they are sufficiently numerous and virile to make it necessary to take their existence into account, whatever our opinion may be about the advisability of making this wholly a white man's country.

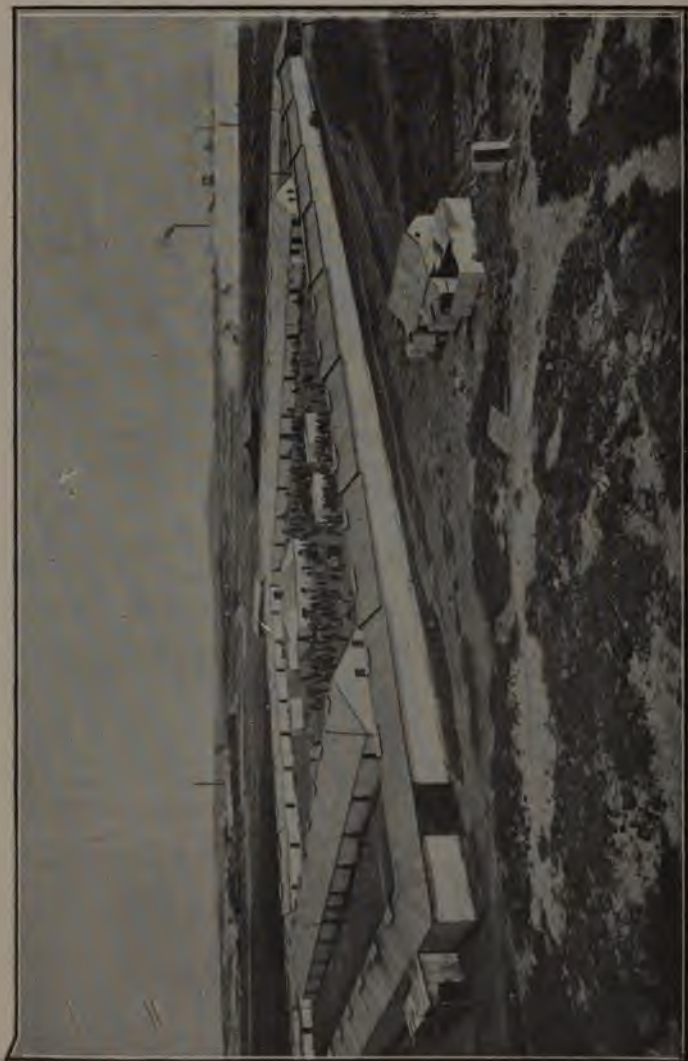
The history of the countries where white and black are thrown together clearly proves that the white are the dominant race, and it is a natural attitude that the white man should feel his superiority and relegate to the coloured man the lower grade of manual work.

The mine owners have recognised this fact and have employed the white man as a skilled artisan, or as a foreman in charge of a gang of natives.

During the stress of periods of acute shortage of labour before and since the war, attempts have been made to employ white men to do ordinary manual work, but these experiments have never proved successful, whether regarded from an economical or a social standpoint.

In order to attract sufficient white workmen to these fields, importation has had to be resorted to, and constantly kept up, South Africa not having the necessary white population to supply the demands.

It has not been necessary to have any formal association for the importation of white labour, as the natural attractions of gold-mining and the high rate of pay obtaining on these fields have been sufficient.



NATIVE LABOURERS' COMPOUND, CROWN DEEP GOLD MINE.

According to the Report of the State Mining Engineer for the year ending 1904, the average rate of wages paid on the Witwatersrand to the technical and clerical staffs was £505 per man per year, and the average yearly wage paid to other white employees on the same area was £329.

The technical and clerical staffs are paid by the month; the majority of the other employees are paid by the day, although in the case of many companies, the miners are paid by the foot driven or the square fathom stoped. This latter method of payment by results achieved tends to encourage the more capable workman to increased exertions and to eliminate the less desirable.

From the Mines Department's statistics for the month of June 1905, it appears that on the gold mines of the Witwatersrand area, there were employed at that date 16,158 whites, the total for the Transvaal gold mines being 16,989. This is a considerably larger number of whites than has ever been previously employed on these fields. Amongst them are representatives of almost every European nationality, but the British are in a very large majority. The proportion of whites to all coloured labour for June, 1905 was 1 : 8.45.

In July 1899, according to the statistics of the Mines Department, 12,530 white men and 107,482 Kaffirs were employed in the Witwatersrand gold mines.

The outbreak of the war put a stop to this industrial machine, and destroyed the momentum which it had taken thirteen years of diligent effort to generate. It can be easily realised that individual endeavour, with its natural consequence of overlapping and waste of energy, could not restore the required number of labourers to start the machine going again at full speed.

The Witwatersrand Native Labour Association, Ltd., was formed in order to recruit labour for the benefit of its members in all parts of Africa which are open for recruiting. The main sources of supply are—the Province of Mozambique, the Transvaal, Cape Colony, Bechuanaland, Basutoland, Rhodesia and British Central African Protectorate.

The Association had on December 31, 1904, 143 recruiting stations in these territories, while it employed 195

European agents and recruiters, and over 2,000 native runners.

From the commencement of its work in March 1901, 246,382 natives passed through its books, with the net result that on December 31, 1904 there were 76,611 natives in the employment of the mining companies who were members of the Association and 5961 in the employ of contractors working for these members, making a total of 82,572 who were supplied by its efforts. To obtain these



TIME-EXPIRED. NATIVES STARTING FOR HOME.

results, a sum of £667,000 had been spent by the Association; the expenditure for the year 1904 amounted to £248,013.

According to the returns of the Mines Department, there were employed in the gold mines of the Witwatersrand area at the end of June, 95,309 natives and a total for the gold mines of the Transvaal of 104,902.

The average rate of pay earned by natives is at present 52s. per month. Food, accommodation and medical attend-



ance are provided free of cost, while the monthly tax of 2s. is also paid by their employers.

The closest attention is now paid to the health of natives. Mine Compounds are under the supervision of Government officials. During the year 1904 the improvement of native quarters, the provision of change-houses and liberal additions to their food have had a marked effect in the diminution of the death-rate. The average death-rate for 1904 was 44·23 per thousand, as against 68 per thousand for 1903.

On arrival at Johannesburg, natives recruited from low-lying districts are subjected to a second medical examination, and those who appear to require special consideration are not drafted to a mine until they become fit. From July 1904, when this system was introduced, to December 31, 1904, 5,849 natives were detained temporarily at the central compound; of these, 4,852 were subsequently allowed to proceed to the mines; 331 were rejected as unfit for mine work, and were returned to their homes free of expense; 119 died in hospital.

The following table shows the results of the operations of the Native Labour Association since its inception:—

	Natives Received.	Distributed.	Wastage from all Causes.
1901	14,851	14,622	
1902	58,261	57,312	25,886
1903	85,377	84,324	55,509
1904	87,893	84,906	74,579

Of the 76,611 natives in the employment of the mines (members of the Association) on December 31, 1904, 32·73 per cent. came from British territory, 66·23 from Portuguese territory, ·87 from German South-West Africa, and ·17 from various sources.

*Chinese Labour.*—Very soon after the re-starting of milling in 1902, it became evident that the scanty population available for recruiting would not supply the necessary labour required to enable the mines of the Witwatersrand to work at their maximum capacity.

A Labour Commission, appointed in 1903, took lengthy evidence and reported that the probable shortage of

labour for all purposes in the Transvaal was 221,000. This calculation was borne out by the South African Native Affairs Commission, 1903-5, which was appointed to recommend a policy to be pursued with regard to native affairs by all the Colonies of South Africa. The Commission estimated that 782,000 natives would be required for labour purposes in Cape Colony, Natal, Transvaal, Swaziland, Orange River Colony, Basutoland, Southern Rhodesia, and the Bechuanaland Protectorate, whilst the total



HAND DRILLING BY CHINESE LABOURERS.

number of natives likely to be at work at one and the same time would be only 474,000—a shortage of over 300,000.

In order to meet this shortfall an Ordinance was introduced to the Legislative Council providing for the importation of indentured labour under stringent regulations from other countries than Africa.

The Labour Importation Ordinance was passed by the Legislative Council on February 10, 1904, and came *into force* on May 19. On June 18, the first shipment of *Chinese*, 1,005 in number, recruited in Southern China,

arrived at Durban, and a week later were installed on the Comet Mine on the East Rand. By the end of 1904, 20,918 Chinese had arrived; on June 30, 1905, their numbers were 42,069 distributed among 27 mining companies. Before the end of July the twenty-fifth shipment will have arrived, bringing up the numbers to 46,000.

Coolies from the southern provinces of China compare unfavourably in point of physique with the Northerners, and seem more prone to disease. Recruiting in these districts, therefore, has been discontinued.

The Chinese are engaged for a period of three years.

A few details regarding the landing of the coolies in South Africa may be of interest.

As soon as the ship is given pratique on arrival at Durban, she is immediately berthed alongside the Bluff wharf, where special trains are in readiness to convey the labourers to the Agency's dépôt at Jacobs, at the head of the Bay. Disembarkation begins at once, and from the commencement until the last train load of coolies enter the dépôt not more than four or five hours elapse. An elaborate system of checking the numbers leaving the ship is carried out by representatives of the Natal Immigration Restriction Department, the Labour Importation Agency, and the African Boating Company, who are the landing agents. The numbers are again checked by the Labour Importation Agency, as the coolies file past the dépôt gate. On arrival at the dépôt the coolies are separated into batches for the individual mines for which the shipment is destined, and it is here that the functions of the Foreign Labour Department of the Transvaal commence. A batch is marshalled in front of the Transvaal Agent's office in the order in which they appear on the contract sheets or indenture paper, and are passed through the office one by one. Each coolie then goes through the following process:—He is asked his name and the number of the ticket he received in China, and, if necessary, he is compared with the photograph taken of each coolie in China before embarkation; if this is satisfactory, he is given a metal passport stamped with a number, which is entered on the contract sheets against the original number given in China.

He then enters the next office, where his identification is assured by going through the finger print process; each finger mark of each hand is taken separately, and then the first, second and third fingers together of each hand. All these finger prints are properly classified, and no mistake can possibly occur as to a man's identification by this process. About 400 coolies are registered each day, this being the capacity of the special coolie trains provided for the journey. These trains are specially fitted with



A BATH ROOM FOR CHINESE LABOURERS.

sanitary compartments, electric light and drinking water supply, and leave each successive morning after the arrival of the ship, in charge of the Labour Agency's conductors. The journey to the Rand takes from twenty-six to twenty-eight hours, and three substantial hot meals are served to the coolies in the train *en route*.

*Wages.*—The coolie receives from the date of his arrival on the mine a minimum rate of pay of 1/- per *diem*; if within six months of arrival the average rate of

pay earned does not reach 50/- for 30 working days, the minimum rate has to be increased to 1/6 per diem. In practice, however, the necessity does not arise, as after a few months' residence, which are required to enable the coolies to attain a reasonable standard of efficiency, the mines allow the coolies to contract to do piece-work instead of working for day wages. By means of a system of bonuses, the coolies are then able to earn considerably more. For the coolies who have been enlisted by Tientsin firms and contractors a system of allotment of wages was instituted. Each coolie is asked before embarkation whether he wishes part of his wages to be paid monthly to his relatives in China; if so, the amount is entered in the contract sheets, and the coolie signs or makes his mark in acknowledgment of the obligation. The coolie is then given a book of coupons, which he hands to his representative, who presents the book at stated intervals and is paid the monthly allotment, which varies between 5/- and 15/- per month. A voluntary remittance system is being elaborated for the coolies' benefit, and the Foreign Labour Department also remit sums through the Transvaal Emigration Agents in China, if desired.

RETURN OF FOOD, ETC., CONSUMED BY CHINESE LABOURERS  
DURING SIX MONTHS, JULY TO DECEMBER, 1904.

	Quantity lbs	Value £
Rice ...	2,161,021	20,856
Meat ...	769,709	11,592
Bread ...	1,031,717	9,240
Vegetables ...	—	3,844
Fish ...	114,419	1,998
Tea ...	17,923	663
Salt ...	52,797	154
All other foods ...	—	1,340
Medicines ...	—	780
Total value		<u>£50,467</u>

*Vital Statistics.*—Taken as a whole the Chinese appear to be remarkably healthy. At the end of May, 1905, the

percentage of sick to the total employed on the Rand was 3·28 and this is one of the worst months experienced here. The most troublesome complaint hitherto has been that of Beri-beri among the Southerners, and if Beri-beri cases are eliminated for the month of May the percentage of sick would only have been 2·64. Mortality is equally satisfactory. Up to the end of May there has been a total of 410 deaths among the Chinese employed on the Witwatersrand; of this total 83 have occurred from Beri-beri and 99 from



CHINESE LABOURERS AT WORK IN A GOLD MINE.

accidents. The following is therefore the death rate among the Chinese per thousand per annum for the 12 months ended May 31, 1905.

From Beri-beri	...	4·236	per thousand per annum.
„ Accident	...	5·053	„ „
„ other causes	...	11·636	„ „
„ all causes	...	20·925	„ „

If deaths from accident are eliminated the death rate is 15·872 per thousand per annum.

## VI.—Summary of the Processes used in the Extraction of Gold.

The broken ore is raised from underground in skips, carrying about three tons per load.

Arrived at the top of the headgear, the skips are automatically tilted up and the contents shot into an ore bin.

On leaving the bin the rock is "sorted." The system mostly in vogue is the sorting table.

The rock passes through a revolving screen, and is at the same time sprayed with water. It thence runs on to the revolving table. The sorters are ranged both within and without the circle of rock; they pick out the waste and throw it into conveniently placed chutes. The pay rock is automatically scraped off at the far side of the table and runs down into the jaws of the crushers on the floor below.

The crushers are usually of the gyratory type, and the rock is delivered from them broken to a size sufficiently small for treatment in the stamp mill.

From the crusher station the ore is hauled to the mill bins usually by mechanical means.

At the bottom of the mill ore-bin are chutes, from which the rock is fed piece by piece into the mortar boxes, the flow being regulated by automatic feeders.

The rock is broken by the stamps in the mortar boxes to a consistency of fine sand and slimes, and is water-borne through the screens over the copper amalgamating plates.

The majority of the free gold is caught by the amalgam on the plates, while the particles held in the sands, the pyritic portion, and the fine gold in the slimes, are carried over the plates and fall from the launder into the sump at the base of the tailings-wheel.

The water-borne tailings are raised by this means above the level of the cyanide works, which are so designed that no further elevation of the material is required throughout the rest of the treatment.

From the launder-leading from the top of the tailings-wheel the tailings pass through a series of three or more hydraulic classifiers called Spitzlутten.

These are boxes so constructed that the heavier sands and concentrates are drawn off at the bottom and are led into vats for special treatment, while the lighter sands and the slimes flow over and continue their course towards the general treatment vats. The concentrates obtained are either treated with cyanide solution in special vats, or are handed over to chlorination works for extraction of their gold contents.

At the foot of the Spitzlутten, the sands and slimes pass through the Spitzkasten.

This is an hydraulic classifier so constructed that by a definite pressure of water being introduced at the bottom of the box, the slimes are borne upwards and over the edge of the box, while the sands are drawn off through the bottom and are led away to the percolating vats.

The sands from the Spitzkasten are run into the top vat through a flexible hose.

When the vat is filled with material, the first cyanide solution is pumped on and is allowed to percolate through the mass. It is drawn off through the filter bed at the bottom of the vat and flows away to the extractor house.

The discharge doors in the bottom of the tank are then opened and the sands are shovelled through into the lower vat, where more cyanide solution is pumped on and drawn off below.

The mass of the sands is then washed with water to extract the remaining solution and the valueless residues are discharged through doors in the bottom of the vat into trucks and hauled away to the tailings-dump.

The water-borne slimes, after leaving the Spitzkasten, are charged with a certain amount of lime by means of an ingenious automatic arrangement.

They are then led into a further series of Spitzkasten, and the action of the added lime is such that the slimes settle in the Spitzkasten and are drawn off at the bottom, *while the superfluous clear water flows off at the top and is returned to the reservoir.*



The slimes, which have now a gelatinous consistency, are run into the slime vats, where they are allowed to settle and concentrate, the bulk of the water being eliminated by decantation. They are then agitated with cyanide solution. The mass is allowed to settle, the solution is decanted off and the residue washed with water to remove the remaining solution. The residue is then discharged through the bottom of the vat into the slimes dam by aid of centrifugal pumps.

The extractor house contains the extractor boxes, the pumps for transferring the solutions and agitating the slimes, and in some cases for returning the clarified water to the mill. In it are also the acid vats for dissolving the zinc and the smelting furnaces for the final stage of the process. The gold-bearing cyanide solution flows in through the pipes at the head of the boxes and flows out, denuded of its gold contents at the foot, whence it is pumped to the solution vats to be used over again.

*[For the various methods of treatment within the boxes the visitor is referred to the article on metallurgy.]*



WHITE MINERS' QUARTERS, JUMPERS DEEP G.M.

### VII.—Mining Statistics.

The following are recent statistics, May 31, 1905, connected with the gold mining companies of the Witwatersrand:—

The distance along the strike of the Main Reef formation from Randfontein on the West to Holfontein on the East is 62 miles, throughout which extent the reef has been almost continuously traced. Of this area, the central section for a distance of about  $12\frac{1}{4}$  miles has produced about 76 % of the gold won.

#### GOLD PRODUCTION.—*Witwatersrand Mines.*

	Ozs. Fine Gold.	Value.	Dividends.
1887	19,080	£81,045	£12,976
1888	171,789	729,715	112,802
1889*	340,774	1,447,514	432,541
1890	408,569	1,735,491	254,551
1891	601,810	2,556,328	334,698
1892	1,011,743	4,297,610	879,320
1893	1,221,171	5,187,206	955,358
1894	1,639,252	6,963,100	1,527,284
1895	1,845,875	7,840,779	2,046,852
1896	1,851,422	7,864,341	1,513,682
1897	2,491,593	10,583,616	2,707,181
1898	3,564,581	15,141,376	4,848,238
1899	3,549,827	15,078,703	2,946,358
1900	352,871	1,498,901	—

\* Includes 42,000 ozs., the estimated unrecorded production of the years 1887, 1888, 1889.

The figures for the years succeeding the British re-occupation will be found on page 256.

The following table shows the total production of gold from all districts of the Transvaal for the year 1904:—

	Ozs.	Value in £.
Witwatersrand ...	3,658,241	15,539,219
Lydenburg ...	55,320	234,987
Barberton ...	33,887	143,940
Heidelberg ...	14,746	62,637
Leydsdorp ...	2,196	9,329
Klerksdorp ...	2,139	9,087
Other Districts ...	13,092	55,610
Totals,	<u>3,779,621</u>	<u>£16,054,809</u>

TONS MILLED — PRODUCTION — DIVIDENDS PAID.  
1887 to May 31st, 1905.

Tons Milled ...	...	60,636,288
Value of Gold Won ...	...	£124,868,128
Dividends paid by 71 Companies ...	...	£28,700,656

GOLD MINING COMPANIES — PRODUCING AND NON-PRODUCING.

*Witwatersrand.*

Name of Group.	No. of Producing Mines.	No. of Developing Mines.	Total Number of Mines in Group.
Albu, G. & L. ...	4	12	16
Barnato Bros. ...	7	16	23
Consolidated Gold-fields of South Africa ...	3	25	28
Eckstein, H. & Co. ...	11	11	22
Farrar Anglo-French... ..	4	16	20
Goerz & Co. ...	5	8	13
Neumann & Co. ...	5	13	18
Rand Mines, Ltd... ..	9	2	11
Robinson, J. B. & Co..	4	12	16
Transvaal Gold-Fields	1	1	2
Bailey, A. ...		10	10
Cohen, H. Freeman ...		6	6
Independent Coy.'s ...	11	24	35
Totals,	<u>64</u>	<u>156</u>	<u>220</u>

TABLE OF GRADE OF PRODUCING COMPANIES FOR MAY,  
1905.

No. of Companies.	Tons Milled.	Value per Ton Milled.
2	17,131	Under 25/-
17	267,544	" 30/-
19	314,488	" 35/-
11	140,503	" 40/-
11	161,841	Over 40/-
3	55,350	" 50/-
<u>63</u>	<u>956,857</u> (Average).	<u>35·13/-</u>

### VIII.—Miscellaneous Intelligence.

*Boreholes.*—The Western Rand Estates claim the deepest borehole on the Rand, having reached a depth of 5,500 feet on the farm "Diepkloof." Two boreholes on the Turf Club are down 5,203 and 5,083 feet respectively.

[For a summary of recent investigations into the deflection of boreholes see page 236].

*Census of the Transvaal.*—On the night of April 17, 1904, a census of the Transvaal was taken, being the second in the history of the country. The former, which was confined to the white population, took place in 1890, and showed a total of 119,128 persons. Last year's figures (preliminary report) give the following results for the Transvaal and Swaziland:—Whites, 300,225; Aboriginal Races, 1,030,029; Other Coloured Races, 23,946; Total, 1,354,200.

The following table shows the total population, area and density of the chief gold-mining centres:—

District.	Population.	Area Sq. Miles.	Number to Sq. Mile.
Barberton ...	27,727	4,463	6·213
Heidelberg ...	27,901	2,410	11·577
Lydenburg ...	104,490	10,468	9·982
Witwatersrand	272,506	1,653	164·856

*Cyanide Patent.*—In November 1896, at the instance of the President of the Chamber of Mines the patents for the cyanide treatment held by the African Gold Recovery Company were cancelled by decision of the High Court of the late South African Republic. The Company applied to the Supreme Court in 1902 to have the case re-opened. On its application being struck off, the matter was carried to the Privy Council; the appeal was dismissed with costs in 1904. This decision finally disposed of a matter which seriously concerned the whole gold mining industry.



HAND SLOPE IN THE FERREIRA DEEP G.M.

*Deep Levels.*—The greatest depth at which mining operations are being carried on is at present 2,500 feet at the Robinson Deep. The reef at this depth has all the normal characteristics observed in outcrop mines. The ultimate depth to which mining will be conducted on these fields is dependent on the grade of ore met with and the working costs, the latter being influenced by labour and supply conditions.

*Dividends.*—Seventy-one companies on the Witwatersrand, representing £23,500,000 of capital (issued), have paid in a period of eighteen years, dividends amounting to £28,331,906. This is an average annual dividend of less than 7 per cent. for each company. By the end of June, 1905, the total dividends paid amounted to £30,000,000.

DISTRIBUTION OF WHITE EMPLOYEES, DEC. 31, 1904.

	On Surface.	Underground.	Total.	Wages paid for Year.
Skilled	7,673	5,462	13,135	£4,159,302
Unskilled	313	725	1,038	177,954
Totals,	<u>7,986</u>	<u>6,187</u>	<u>14,173</u>	<u>£4,337,256</u>

DISTRIBUTION OF COLOURED EMPLOYEES, DEC. 31, 1904.

	Employed.	Working		Total.	Wages Paid for Year.
		Surface.	Underground.		
Natives ...	77,014	20,945	48,515	69,460	£1,962,990
Cape Boys	1,188	114	776	890	93,870
Indians ...	1,025	786	182	968	46,143
Chinese ...	20,396	4,230	14,231	18,461	55,368
Totals,	<u>99,623</u>	<u>26,075</u>	<u>63,704</u>	<u>89,779</u>	<u>£2,158,371</u>

*Extraction of Gold.*—Up to the time of the discovery of the Witwatersrand deposits, no auriferous conglomerates had been worked on a large industrial basis in any part of the world. At first, the amount of gold extracted by the amalgamation process did not exceed 50 or 60 per cent. Later on, concentration and chlorination of concentrates improved matters, but it was not until the chemical treatment of all the sands and slimes by the cyanide process was introduced that satisfactory results in this direction were attained. To-day, on all well-equipped mines, 90 per cent. of the gold is extracted. The introduction of tube mills, it is anticipated, will increase the amount of gold won to 93 or 95 per cent.

*Gold Law.*—In 1903 the Government introduced a draft revised Gold Law, which was read a second time by the Legislative Council and referred to a Select Committee.

This Committee presented its report on July 13, 1904, annexing thereto an amended draft law. The majority of the members favoured the owner's rights on proclamation being consolidated into a mynpacht of one-fifth of the extent of his farm, while a minority held that one sixth was sufficient. The Government intends to hold the Bill over until an elected Assembly is in session.

*Miners' Phthisis.*—Prizes were offered by the Chamber of Mines for the three best practical suggestions and devices for obviating or minimising the occurrence of this disease. There were 229 competitors. The award was made in April 1904, the first prize of £500 and gold medal being given to T. J. Britten's Atomiser, the second prize of £250 to the Leyner Water Drill; the third prize was not awarded. The judges considered that all devices, except the Water Drill and Atomiser were inapplicable. No absolutely practicable device was submitted, but Mr. Britten's Atomiser constituted the best practical suggestion, while the Leyner Drill embodied the ideal principle. In the opinion of the judges the best means of combating the disease would be the use in drilling of a perfect Water Drill, together with the use of an Atomiser for allaying dust and gases during blasting and shovelling.

*Native Deposit and Remittance Agency.*—An Agency, under the control of the Native Affairs Department, has been established in the Transvaal for the purpose of remitting native moneys to any place in British South Africa. All remittances are forwarded daily. A fee of two shillings and sixpence is payable on every remittance irrespective of amount. Money is also received for the purpose of safe keeping; any amount may be deposited, and no charge is made for keeping the money till called for.

*The Profits Tax.*—The Profits Tax Proclamation of June 1902, imposed a tax of 10 per cent. on the annual net produce obtained from the working of gold-bearing properties. This net produce is ascertained by deducting from the value of the gold produced the cost of production and such sums as might be allowed in respect of exhaustion of capital, as defined in the Proclamation itself. It is now proposed to exempt from payment of the Profits Tax mines

which are worked by their owners and yield less than £1,000 per annum.

*Stamps.*—On the Witwatersrand area there were 8,200 stamps of an average weight of 1,140 lbs. erected at May, 31, 1905. In outside districts there were on December 31, 1904, 1,211 stamps erected, of an average weight of 825 lbs. For the month of May 1905, 6,542 stamps were being dropped on the Witwatersrand; their average duty was 5·03 tons per stamp per diem.

*Shaft Sinking.*—The deepest shaft on the Rand is the Catlin Shaft on the Jupiter Mine, which on June 15, 1905, had reached a depth of 4,010 feet. The Howard Shaft on the Simmer and Jack West had been sunk 3,687 feet on the same date.

*Stores.*—The total value of stores consumed on the gold mines of the Transvaal during 1904 amounted to £5,733,541, the largest items being:—Coal, £870,372; machinery and machine tools, £767,015; explosives, £704,748; timber, £400,840; native food, etc., £380,331; cyanide, £235,866; pipes, £205,447; candles, £135,114.

*Underground Temperatures.*—Experiments conducted by Mr. H. F. Marriott, of Messrs. Eckstein's engineering staff, have proved that the increase in temperature amounts to 1 degree Fahrenheit for every 208 feet of depth, or 48 degrees Fahr. per 100 feet in depth.

Mean earth temperature at 1,000 ft. deep = 68·75 Fahr.

2,000 „ „ = 73·55 „

3,000 „ „ = 78·35 „

4,000 „ „ = 83·15 „

These earth temperatures are considerably modified in the mines by the cooling effect of the natural ventilation.

*Deflection of Boreholes.*—The deeper levels of the Witwatersrand Main Reef formation have been widely prospected by boreholes sunk by diamond drills, situated at varying distances from the outcrop.

As instances, the deeper levels of the central portion of the Witwatersrand have been proved by seven boreholes to the distance of over 6,000 feet from the outcrop. The Eastern Extension of the Main Reef series beyond the continuous mining area has been prospected by no less than



100 boreholes, measuring in the aggregate 160,000 feet drilled at a total cost of over £380,000, apart from all administrative charges.

Until the last few years the sections obtained from the strata brought up by the drills have been accepted as representative of the formation situated vertically below the mouth of the boreholes, which have, with a few isolated exceptions, been started in a vertical direction.

In the year 1899, two boreholes were located in a central position on the Central Rand, on the Property of the Johannesburg Turf Club. These constituted the deepest prospecting venture hitherto undertaken and the results were watched with great interest.

The holes were situated some 9,000 feet from the outcrop and the drills were set up to bore vertically downwards. Work had to be stopped during the war, but drilling was continued in 1901, when the holes were completed. The reefs were struck in the two holes at 4,802 feet and 4,742 feet respectively.

The strata sections obtained showed a regular dip of  $27^{\circ}$  in conformity with surface indications and calculations based on information afforded by the outcrop mines and the two rows of deep level mines in the vicinity.

In order to correct any possible difference due to borehole deflection, Mr. H. F. Marriott, of Messrs. Eckstein's engineering staff, had during the period of cessation of operations, designed instruments capable of making complete survey of the course of each hole. Preparations were also made by the same engineer to continue the earth temperature experiments which had been carried out through the goldfields.

Preliminary tests with a hydrofluoric acid tube gave such startling readings of deflection at depth, that the complete surveys with the special instrument made for that purpose were proceeded with as rapidly as possible. By this instrument the lower depths of each hole were proved to have deviated over  $60^{\circ}$  from the vertical, and the previously presumed depths of reef, viz. :—4,802 feet and 4,742 feet in the two holes were corrected to 3,910 feet and 3,745 feet respectively. The positions at which the Main Reef series

was intersected were located as 2,185 and 2,175 feet horizontally from the points at which the boreholes were started. The holes, when mapped out, were proved to have taken a course through the regular formation which gave dip readings of strata and depth records practically identical with those which would have been obtained had they continued in an absolutely vertical direction.

Results obtained by the instruments used in this work marked the commencement of a new era in borehole surveying. Previous methods involving the use of gelatine or clockwork action had many sources of error which were now eliminated. The principle of the new departure is that the instruments can be controlled from the surface by means of electricity while they are in the borehole in the position required to be surveyed.

The instruments are of two kinds.

One variety works on the principle of liquifying a solid by means of a heating coil, and then allowing it to cool by natural means. The recording instrument is thus freed while in position and is locked again absolutely without any external movement taking place.

The other design gives the readings at the surface by means of a delicate galvanometer simultaneously with the records being taken by the instrument in position in the hole; the degrees of inclination being registered by different resistances introduced into the circuit by a switch acted on by a series of plumb bobs. The instruments are connected with the surface by means of a strong cable which serves the double purpose of carrying the current and the instruments, and by its rigidity enabling readings to be taken at greater depths than is possible when the instruments are lowered by gravity only.

The general evidence afforded by the surveys made with these instruments is to the effect that in the regular Witwatersrand strata a borehole, sunk by means of a diamond drill, tends to assume at depth a final position perpendicular to the plane of the strata.

This systematic deflection of boreholes on the Witwatersrand Gold-fields in no way decreases their value *as an adequate means of deep level prospecting*. But now

that the making of a reliable survey in every case is generally accepted as a necessity, the information afforded by the cores will in future be more determinative of the actual geological conditions obtaining throughout the sections than has hitherto been the case.

---

### IX.—The Coal Industry.

The coal mining industry of the Transvaal commenced with the opening of the Rand Goldfields. Before the discovery of the value of the blanket beds, coal was only worked by the inhabitants for the very few industrial establishments situated near the outcropping seams, generally at the side of a river or on the side of a hill, and the winning was usually done by quarrying.

In the early eighties, Messrs. Lewis & Marks opened up coal beds at Vereeniging on the Vaal River, and it was proposed to send the coal won down the Vaal River to Kimberley, a scheme never carried out.

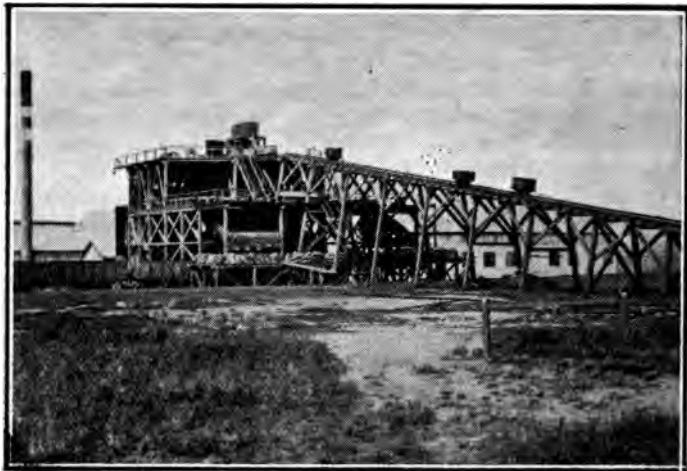
With the development of the Rand, it became evident that the supply of fuel was likely to prove a serious problem; labour was plentiful, money was available, but wood, the first fuel used in Johannesburg, was expensive, and the local supply available was exceedingly limited. At this time the Vereeniging coal was only opened in a very small way, and the supply obtainable here was insufficient for local requirements.

The Wilge River and Oliphants River coal beds in the Middelburg district were quickly drawn upon, as the seams were exposed ready for mining and the supply available was ample, but the cost of transport was very great and the price paid by the gold mines in some instances reached £3 per ton.

In December, 1887, prospectors searching for gold on the Government ground Vogelfontein at Boksburg struck a seam of coal, and directly afterwards coal was found at Brakpan and Springs in shafts being put down for gold. From that time onwards there has been no doubt as to fuel being obtainable for all purposes in the Transvaal, and

at such a price that the low cost of fuel would be one of the favourable factors in the development of our resources.

The coal seams are generally of considerable thickness, and in the early days a working thickness of 14 to 18 feet was quite common. They often outcrop in such a position that they can be worked by means of adits, but generally they lie at comparatively shallow depth, from 65 feet to 300 feet. In some instances workable seams lie at depths up to 650 feet.



BELFAST COLLIERY HEADGEAR.

Transvaal coal seams almost invariably contain alternating layers of anthracitic and semibituminous coals with layers of very inferior coal or shale; the floor and roof are generally shale, but in some cases the roof is sandstone. The coal carries a high percentage of ash; the analyses annexed are from typical samples.

Coal occurs in detached areas over the high veld; these areas vary much in size and in the character of the coal. The seams usually lie almost horizontal or at only *a slight angle*, but as a rule the faults and rolls do not *seriously impede* the winning of the coal.

Water is rarely met with in any quantity in the coal mines. Fire damp is of very rare occurrence and never in any quantity.

In opening up a colliery the first operation is to sink and connect a main shaft and an air shaft. Main drives are then carried out parallel in each direction, starting from the principal shaft. From these main drives secondary drives are carried, off which "bords" or "rooms," corresponding to the stopes in a gold mine, are run, and from such "bords" or "rooms" the principal quantity of coal is obtained. The coal may be undercut at the floor of the seam by natives using picks, generally at about the middle, the portion of the seam left standing being blasted down. In some cases the whole removal is done by blasting, as in a rock heading.

The average thickness of coal being worked may be set down at 10 feet. A fair scale of widths of workings is:—Main drives, 15 feet; secondary drives, 18 feet, and bords or rooms, 21 feet; pillars alongside drives, 21 feet wide, and inside pillars, 13 feet to 15 feet square. These inside pillars are often robbed until they fail to support the roof. The falling in of the whole overburden may lead to spontaneous combustion, with the result that a section of the colliery is set on fire.

Collieries are worked for the most part by hand labour; in a few mines only have mechanical coal cutters been installed. Nearly all have an underground track of 18 inch gauge and use trucks of from 20 to 30 cubic feet capacity.

At the principal mines two trucks are raised in each cage and cages are invariably single deckers.

Practically all the coal broken in the mine is raised to the surface, underground selection being impracticable. For underground haulage, the endless rope system is usually adopted.

The surface equipment for handling the coal raised in nearly every case follows broadly the same lines.

Loaded trucks raised from the shaft pass on to revolving tippers mechanically operated; coal falls on to fixed or shaking screens; the large coal passes on to endless belts, either plate or bar type, where it is hand-picked, all the

shale and inferior coal being removed. From there the clean coal passes to the railway waggons, or to bins, from which it may be filled into sacks.

The coal passing through the first screen (under tippler) now goes through revolving screens or trommels to make nuts coal from 1" down to  $\frac{5}{8}$ " size, and pea coal from  $\frac{5}{8}$ " to  $\frac{3}{8}$ " size, and slack or dross, which is usually sent to the waste heap or used on the colliery to fire the boilers. About 25 % of the output is sorted and screened out as waste, leaving 75 % merchantable coal. This is graded from 75 % to 80 % large coal, the balance being nuts coal and pea coal.

The coal produced is chiefly used for steaming purposes, but a fair quantity is used for smithy purposes and also for the production of illuminating gas. A portion of Johannesburg is supplied with gas from Transvaal coal.

The principal market for Transvaal coal is furnished by the mines on the Rand; next come the Government Railways, industrial concerns and domestic trade.

The output for the last four years was as follows :—

Month.		Total Coal Sold. Tons.	Total Value. £
Statistical Year 1901-1902	...	1,134,871	469,769
Statistical Year 1902-1903	...	1,969,089	782,906
Statistical Year 1903-1904	...	2,370,465	895,931
Statistical Year 1904-1905	...	2,513,824	874,856

Demand for coal is steadily increasing; the capacity for producing is, however, increasing more rapidly, and to-day there are at least 14 collieries equipped and developed for an output of 1,000 tons of coal per day, some being equal to an output of 1,600 to 2,000 tons per day.

The nearest collieries to Johannesburg are the Brakpan and Apex at Brakpan Station, about  $1\frac{1}{4}$  hours from Johannesburg. This is the area from which most of the coal used on the Rand in the early days was obtained.

A few miles further east the Springs coal area is reached; here the coal measures rest upon dolomite, the area is small and much broken by dykes, and great variation in thickness and quality occur within very narrow

limits. At one colliery workings can be seen where the coal was worked a thickness of over 30 feet.

To the eastwards of the Springs area large coal-beds are found, but the chief deposits in the Transvaal are on the Wilge and Oliphants Rivers and in the district between these streams.

Near Balmoral, six hours by rail from Johannesburg, several collieries are working by adits and producing good coal.

At Brugspruit and Witbank, 6½ hours by rail from Johannesburg, the largest collieries in the Transvaal will be found. These collieries supply the greater portion of the coal used by the railways; large quantities are sent to the gold mines, while increasing amounts are shipped annually at Delagoa Bay.

Further east, at Belfast, are more collieries supplying coal to the mines and railways, and to vessels at Delagoa Bay.

To the south of Johannesburg, two hours by rail from Johannesburg, are the Vereeniging collieries, supplying the Cape, Orange River and Transvaal railways, and gold mines on the Rand.

The geological conditions obtaining here are of the greatest interest. (See at end of the next chapter.)

On the Transvaal-Natal Railway, near Balfour, 3½ hours by rail from Johannesburg, is the South Rand Coal-field, now being opened out.

The origin of these coal-fields deserves more attention and consideration than has, so far, been given to the question. We have local deposits of coal having the same general characteristics, but varying very much in detail.

The coals contain a high percentage of ash, they are low in fixed carbon, nearly every seam is made up of alternative layers, of anthracitic and semi-bituminous coals with bands of very inferior coal or shale. Generally, the lower seam is best from a commercial point of view, and the bottom section of this seam carries the best coal, the upper portion of the seam carrying very inferior coal.

In many cases a thin seam of coal occurs well above the main seam, and this thin seam carries a more bitumin-

ous coal than that in the lower seams. It carries, however, much pyrites also, rendering it unfit for steam or house coal.

Often the change from coal to soft shale is very gradual. In many ways the occurrence of these coal beds more nearly follows the conditions of ordinary sedimentary deposition than the accepted theory that the coal beds are the remains of primeval forests submerged and changed to coal.

E. W.



ENTRANCE TO LICHTENBURG FROM MAFEKING ROAD.

### X.—Geology.

There are two peculiar features in the geology of the Transvaal which it may be as well to mention at once. The first is the total absence of fossils from most of the stratified rocks occurring in the country. Indeed, it is only in the coal measures that any extensive series of fossils has been found. There is also a record of certain obscure remains having been found by Professor Cohen in the dolomite between Klerksdorp and Potchefstroom, but although the dolomite is very extensively developed in the Transvaal,



no other searcher has up to the present time found fossils in it. These being the facts, it will readily be understood how extremely difficult correlation becomes, not only correlation of Transvaal formations with those of foreign countries, but correlation with the formation of Cape Colony and Natal, and also correlation even within the boundaries of the Transvaal itself. The absence of fossils is to some slight extent compensated for by the remarkable persistence of petrographical features, but such a fact supplies only an imperfect and at times even dangerous substitute for fossils in the matter of correlation. Add to this feature that the systematic study of geology in the Transvaal has only been carried on for a few years, and it will easily be understood that even the main sub-divisions of our rocks have not as yet been finally agreed upon, and that local geologists are always in that state of mind which is prepared to hear of a new formation having been discovered, or a radical alteration in classification suggested.

The second feature in Transvaal geology is that with the exception of recent superficial deposits, no formation is known younger than the coal measures, which Mr. Seward has determined to be of Permo-Carboniferous age. It will be seen, therefore, that the Transvaal has not been submerged for an immense period of time, and while scores of thousands of feet of strata were being laid down in some other parts of the world, the Transvaal was continuously a land surface—subjected to sub-ærial denudations through unimaginable periods of time.

The rocks of the Transvaal may be sub-divided in descending order as follows:—

KARROO	{	Ecca.
SYSTEM.—	{	Dwyka Conglomerate (Unconformity).
	{	Waterberg Sandstone (Unconformity).
TRANSVAAL	{	Red Granite.
SYSTEM.—	{	Pretoria Series.
	{	Dolomite Series.
	{	Black Reef Series (Unconformity).
VENTERSDORP		VAAL RIVER SYSTEM (Unconformity).
WITWATERSRAND		SERIES (Probable Unconformity).
SWAZILAND		SERIES (With Intrusive Granite).

At one time the whole of the rocks below the Black Reef Series were classed together in one system, which has been called by some geologists the South African Primary System and by others the Archæan System. The tendency now is to make two systems, Molengraaff suggesting that the name Vaal River System should be given to the Ventersdorp Series, and that the name Rand System be given to the rocks below this Series. Hatch, on the other hand, suggests that the division be made below the Witwatersrand Series, and that the name Heidelberg System be given to the Ventersdorp Series and Witwatersrand Series combined, and that "Archæan System" be retained to designate the Swaziland Series with intrusive granite.

No exact correlation of Transvaal formations with those of Cape Colony and Natal below the Karroo System has been made out as yet. It is generally considered that the Cape System is more or less equivalent to the Transvaal System, and, indeed, the latter system was at one time known as the Cape System; but, as the correlation was lacking proof, the present name is evidently more suitable.

#### GEOLOGY OF THE RAND GOLDFIELDS.

*General Section of Strata.*—Between Johannesburg and Pretoria there lies a large granite boss, and if from the southern limit of this boss—that is, from a point a little over two miles north of Johannesburg Market Square—a section southward be described, a good idea of the geological structure of the Rand should be gained. The granite is of Archæan age, and is usually known as the "old" or "grey" granite, to distinguish it from the newer red granite of the Bushveld. The Swaziland Series is missing in this locality, and the Witwatersrand beds lie directly upon the granite. The Witwatersrand Series is sometimes divided into an upper and a lower division. The distinction is convenient on the Rand, but there is no unconformity, and on going further afield, the division cannot be very clearly defined.

The Lower Witwatersrand Division consists of alternating beds of quartzite and slate dipping steeply to the south. The slates are mostly red or purple and the older

ones contain a considerable amount of oxide of iron, and are magnetic. The most notable bed is the "Hospital Hill Slate." It lies a mile to the north of the Market Square, and helps to form the prominent ridge which runs east and west. It is a hard slate formed of parallel bands of quartz, jasper, specular iron, and magnetite. Owing to its peculiar appearance it is sometimes called "Calico Rock." Often this rock is strangely contorted. There are occasionally beds of conglomerate in the Lower Witwatersrand beds,



A DRIVE, FERREIRA DEEP G.M. PNEUMATIC DRILLING.

but they are not usually very persistent, nor have they so far been proved to carry more than small quantities of gold. The division ends about a third of a mile south of the Market Square.

The Upper Witwatersrand Division commences in ascending order with the Main Reef Series of conglomerate beds, which are the chief gold carriers of the district, and which will be described in detail later. South of this there are two other series of conglomerate beds—the Bird Reef Series some half-mile away, and the Kimberley Reef Series

another half-mile south. Though both these series carry a little gold, they are not of any commercial importance. Between the conglomerates, beds of sandstone and quartzite chiefly occur. Although there is some slate, it is not so much in evidence as in the Lower Witwatersrand Division.

Some distance south of the Kimberley Reef Series there is a great thickness of conglomerate beds with quartzite, known as the Elsburg Series. This has often been placed with the Witwatersrand beds, but recently considerable doubt as to its conformity with the beds below it has been expressed. Hatch and Corstorphine class it provisionally with the Klipriversberg Amygdaloid, which begins nearly five miles south of Johannesburg; the two together representing the Ventersdorp Series in the district. Overlying the amygdaloidal diabase the Black Reef Series occurs. The Black Reef itself is a conglomerate bed at the bottom of the series. It is usually only a foot or two in thickness, and, though it carries gold, its value is so irregular, that it has not been worked to any great extent. By travelling still further to the south, the Dolomite Series and the Pretoria Series are met with in due sequence, but there is no Waterberg Sandstone, as far as is known at present. Our section, however, has already led us sufficiently far away from the locality we are now especially interested in, and so we will return to the Rand.

The Main Reef Series consists usually of three principal reefs; the Main Reef itself, which is the most northern of the three, the Main Reef Leader, and the South Reef. There is another reef to the north and several leaders further to the south, but these have no commercial importance. Both the Main Reef and the South Reef usually consist of several beds of conglomerate, or "Banket," as it is called in South Africa; "Banket" being the Dutch name for almond rock and also for conglomerate which is supposed in some degree to resemble the sweetmeat. The individual beds of banket are spoken of as "Leaders."

The Main Reef in the Central Rand is often as much as 15 or 20 feet thick, but it is frequently poor in gold and can only be worked here and there. The Main Reef Leader lies just to the south of the Main Reef, sometimes a foot or

two away and at other times 5 or 6 feet away. It is from a foot to 3 feet thick, and is much more uniformly rich in gold than the Main Reef, being generally worth working. The South Reef in the Central Rand lies some 80 feet south of the Main Reef Leader, and usually consists of two or three comparatively thin leaders some two or three feet apart. These leaders may be as much as two feet thick, but generally they are less, and sometimes one or other of them is represented by a single line of pebbles. The leaders do not all carry the gold values: as a rule one, frequently the lowest is much richer than the others. On the whole the South Reef has perhaps proved the richest and most consistent gold carrier on the Rand, for, though thin, it often averages a couple of ounces over a workable width for considerable lengths and assays of hundreds of ounces to the ton are not unknown.

The Main Reef Series near Johannesburg dips very steeply south near the outcrop, though it flattens in depth. Thus near the surface at the Ferreira the dip is over  $80^{\circ}$ , whilst at the Robinson Deep the dip is about  $30^{\circ}$ . At the Simmer and Jack Mine conditions are exceptional owing to a large dyke, and near the outcrop the reef is almost flat. However at some depth it attains a dip of between  $30^{\circ}$  and  $40^{\circ}$ .

Faults and diabase dykes frequently disturb the reefs. Occasionally they are so numerous in a particular property as to interfere seriously with mining operations. Throws of as much as 600 feet measured horizontally are known, though usually they are of less magnitude. The dykes are not always accompanied by faulting, neither are the faults always accompanied by dykes. Indeed, the faults are much more numerous than the dykes.

*Lateral Extensions of Reefs.*—Travelling westwards from Johannesburg, we notice that the South Reef gets further away from the Main Reef Leader till it attains a distance of about 140 feet. The Main Reef gets thinner, but, as before, it is irregular in value, and is only worked in places. The other two reefs are also less uniformly rich. At Roodepoort, some 13 miles west of Johannesburg, a richer area occurs, and some two miles beyond this the

reefs are cut off by what is known as the Witpoortje break. The nature of this break is even yet not thoroughly understood, and the correlation of the payable reefs, which have been found beyond it by going north, with the Main Reef Series, is still not altogether clear. Two reefs beyond the break are being worked—namely, the Botha Reef and the Battery Reef. They are some 4,000 feet apart, and perhaps the most generally accepted theory is that the Botha Reef is equivalent to the Main Reef, whilst the Battery Reef



QUARTZ STRINGER FAULTING, SIMMER & JACK G.M.

really belongs to the Kimberley Series. Just beyond Krugersdorp the reefs make a sharp bend to the south and dip east. On this section the Randfontein Mines occur. Further south still the strata is much broken, but the reefs apparently take a bend to the south-west and run under the Black Reef Series and Dolomite Series, where they have been followed to some small extent by boreholes. *Eighty miles further to the S.W. reefs are known to exist; but their correlation with the Rand reefs has not yet been proved.*

Starting again from Johannesburg and going eastwards we find that the South Reef approaches nearer and nearer to the Main Reef Leader, till by the time the Simmer and Jack Mine is reached, the three reefs may almost be looked upon as forming one reef series, though the three reefs are still distinguished for some distance further. On the Witwatersrand Mine there is a triplication of the reef series caused by longitudinal faulting, and beyond this—on the mines of the East Rand Proprietary Group—the reef series is duplicated for a long distance by a longitudinal dyke. Beyond these mines the Boksburg break (18 miles east of Johannesburg) is met with. The nature of this break has now been demonstrated by means of boring. It is caused by an anticline almost at right angles to the strike, accompanied by faulting. The beds having been subsequently planed off by denudation, the effect is that the outcrop turns to the south and afterwards back to the north again. In the neighbourhood of Boksburg, the outcrop runs under the coal measures, though beyond on the Kleinfontein Mine, Van Ryn, and on Klipfontein it comes out again. Beyond this, the outcrop is again covered by newer formations, though it has been fairly accurately located by means of boreholes. It turns to the south, and is probably identical with the Nigel Reef, though this correlation is not universally acknowledged. In the Far East Rand, the reef series seems to be more irregular than in the Central Section. Sometimes there is quite a thick series with numerous leaders; at other times the reef is apparently very thin; but as yet comparatively little mining has been done beyond the Boksburg break.

The reduction in the angle of dip in the Central Rand as depth is attained, and the turning of the outcrops of the reefs southwards both east and west has given rise to the theory that there exists a basin shaped occurrence, and that a southern limb corresponding to the Rand will be found in the Orange River Colony. It is true that at Vredefort, to the south-west of Johannesburg, there is a granite boss, and that the sequence of strata there is similar to the Rand, but it is not known as yet to what extent the basin theory is justified.

*Character of Banket.*—The pebbles of the reefs consist mostly of quartz, though occasionally quartzite and chert pebbles occur, and more rarely slate pebbles. They are ovoid in form, well rounded, and with regard to size the average would perhaps be a little less than an inch in diameter. The size is, however, variable, pebbles as large as six inches in diameter being occasionally found, whilst sometimes the pebbles are as small as peas. The interspaces are filled with quartz grains, and the whole



A FAULT AND DYKE. THE PEBBLY PORTION IS THE "BANKET."

consolidated into a hard rock by a silicious cement. There is always a certain amount of sericite and talc in scales and fibres which often gives the conglomerate a somewhat greasy feel. Iron pyrites is also invariably present. It occurs in irregular fragments, in crystallized forms and also in rounded concretionary forms; spherical pellets being not infrequent in some localities. These rounded forms were at one time supposed to be waterworn, but the pyrites is quite clean except in the oxidised zone of the reef, and as the pellets frequently exhibit either a radial or



concentric structure it is more probable that they are concretions.

Gold is very rarely visible in hand specimens of the conglomerate, though it can be readily seen in microscopic sections of rich specimens. It occurs in minute angular fragments, very usually around the periphery of the particles of pyrites, or in their neighbourhood, though never inside them. It is sometimes more or less crystallized in form. With regard to its origin, though some still cling to the probability of its being detrital—that is, derived from some older deposit—the more general opinion nowadays is that it has been brought to its present lodgings in solution by subsequent infiltration.

Besides those already mentioned, other minerals occur in the conglomerate; thus chlorite and muscovite are frequent, whilst rutile and zircon are also found. In certain localities a black carbonaceous mineral occurs, which at times seems to have an enriching effect on the reef. In one locality at Klerksdorp small green diamonds were found, and minute quantities of iridium are obtained from the Rietfontein Reef.

Considering the class of rock, a remarkable character of the conglomerates is their persistence. This persistence must not, however, be misunderstood. The leaders themselves are not peculiarly persistent, as they generally vary greatly in thickness, often within a few feet, and they die away and make again. It is really the zone of leaders which is persistent. The gold contents also vary very greatly in detail, but on the average they show remarkable uniformity, so that in particular localities it is often possible to predict the value of a property before it has been touched. This average uniformity is also illustrated by the fact that the milling value of the ore at certain mines has only varied within narrow limits over a number of years.

#### GEOLOGY OF THE COAL FIELDS.

Although coal in the Transvaal occurs in the newest stratified formation in the Colony and the gold is found in

rocks of much more remote age, yet, geographically, the two occur quite close together. This fact has had a most important bearing on the commercial prosperity of the Rand. In places the coal measures overlie the Witwatersrand Series, and bore holes pass through coal seams near the surface and gold bearing conglomerates in depth.

The coal measures in the Transvaal belong to the Karroo System, as do those of Cape Colony, only whilst in Cape Colony coal is worked near the top of the System our coal occurs near the bottom of the System. Indeed, it is not yet proved that we have any Upper Karroo formation at all in the Transvaal, though Molengraaff considers the so-called Highveld Series of the south-eastern part of the Colony to be probably of that age.

The Karroo System occupies an area which is roughly 120 miles square in the south-eastern corner of the Transvaal, but besides this continuous area there are numerous detached patches—some of considerable area—to the north-west and west, as at the South Rand Coalfield, Vereeniging, Syferfontein and other localities. The nearest coal to Johannesburg is at Boksburg, where coal was worked in early days. Now, however, the nearest localities where coal is being worked are Brakpan and Springs.

At the base of the Karroo System is found the Dwyka Conglomerate as in Cape Colony. This conglomerate is of glacial origin and is very widely distributed. It is exactly similar in character and origin to the boulder clay of the northern hemisphere, only the fine grained portions have been altered and indurated. The boulders are not infrequently striated. Above it occur the Eccle beds consisting of shales, sandstones and grits. Whilst the Dwyka varies from a few feet up to 60 feet and even more in thickness, the beds above it increase from about 100 feet in thickness in the western part of the area to many hundreds of feet in the eastern part.

The coal seams occur in the western part of the area directly upon the Dwyka Conglomerate. Indeed, at Vereeniging, Dwyka Conglomerate occurs not only under *the coal but over it as well*. In the eastern part of the *area the coal is separated from the Dwyka Conglomerate*

by 600 to 1,000 feet of sandstones and shales. At Vereeniging, above the coal seams, numerous plant remains have been found in a fine grained sandstone. These were determined by Mr. Seward to belong to various species of *Glossopteris* and *Gangamopteris*; *Sigillaria* also occurs and other genera. He considered that the association of species pointed to a Permi-Carboniferous age.

The thickness of the coal seams varies, but the seams being worked are sometimes as much as 20 feet thick, without shale partings. At other times shale partings occur. The coal nearest to Johannesburg is not of very good quality, that worked in the Middelburg district being better, though still far short of good English coal. The following may be taken as typical analyses:—

		Springs Coal.	Middelburg Coal
Moisture	...	0·15 %	0·57 %
Volatile Matter	...	24·86 %	14·10 %
Fixed Carbon	...	64·25 %	63·00 %
Ash ...	...	10·67 %	22·00 %
Sulphur	...	0·07 %	—
		<hr/> 100·00 %	<hr/> 99·67 %
Coke ...	...		74·97 %

There is generally an excellent roof to the coal, and it can be worked cheaply.

There is for the most part no fireclay under the seams of coal, and it cannot be considered that the vegetable matter of which the coal was formed grew *in situ*. Indeed, there is little doubt but that the coal resulted from accumulations of drift wood. This probably accounts in part for the irregular character of the coal seams. The seams for the most part lie horizontally and at shallow depths. They have been comparatively little disturbed by faulting, though diabase dykes are of fairly frequent occurrence.

It may be added that the coal measures of the Colony have only just been touched as yet. Without doubt they contain a reserve of fuel which will last for a very long period of time.

J. G. L.

# Government Mining Returns.

## SUMMARY OF GOLD OUTPUT.

Period.	Ounces.	Value, £
Statistical Year, 1901-2	891,999·196	3,788,968
Statistical Year, 1902-3	2,372,075·928	10,065,926
Statistical Year, 1903-4	3,475,311·225	14,762,184
Statistical Year, 1904-5	4,325,633·449	18,374,117
1904.—July	306,016·049	1,299,881
August	312,723·245	1,328,366
September	312,940·790	1,329,280
October	323,689·537	1,374,944
November	336,082·023	1,427,587
December	362,164·491	1,538,377
1905.—January	371,692·281	1,578,487
February	366,617·505	1,557,291
March	400,210·765	1,699,691
April	403,057·340	1,712,071
May	416,090·319	1,767,438
June	414,349·104	1,760,044

## SUMMARY OF DIAMOND OUTPUT.

Period.	Carats.	Value, £
Statistical Year, 1902-3	33,572·57	46,358
Statistical Year, 1903-4	497,917·14	685,720
Statistical Year, 1904-5	995,022·51	1,198,530
1904.—July	85,330·75	117,667
August	105,060·38	151,481
September	91,765·00	111,204
October	84,154·81	94,087
November	84,718·50	100,259
December	77,852·50	86,251
1905.—January	80,637·94	89,778
February	78,769·25	91,378
March	96,543·88	111,772
April	80,462·00	93,992
May	69,745·50	80,551
June	59,962·00	70,110

### The Dynamite Factory, Modderfontein.

Population—Whites, 600 ; Coloured, 1,200.

Dynamite has played a very important part in both the domestic and political economy of the Transvaal since the discovery of the Witwatersrand. Before the advent of railways it had to be transported very long distances by waggon the journey sometimes occupying as long as three weeks. Under such circumstances it was not a cheap commodity, but neither was anything else in those days.



THE STORES AT THE DYNAMITE FACTORY.

Before the Modderfontein Factory was built, manufacture of a kind was carried on at Loenfontein, in the neighbourhood of Pretoria ; but on account of political and other circumstances, the late Republican Government declared the manufacture a State monopoly. They appointed an agent to deal with the matter, and as a result of the concession the Modderfontein factory was built, and actual manufacturing operations commenced towards the close of that fateful year 1896. Although the mining in-

dustry, even at that time, had expanded beyond the wildest dreams of the pioneers, much greater developments were yet ahead, and, whereas the factory was originally designed for an output of 80,000 cases annually, three and a half years afterwards—*i.e.*, just before the war—it was turning out at the rate of 400,000 cases per annum, equivalent to 10,000 tons—a truly gigantic quantity. Indeed, no other factory of its kind in the world carried out the manufacture of explosives on such a gigantic scale. It now produces 24,000 cases weekly, each case containing 50 pounds of dynamite.

In the early stages of the war the Boer Government, in virtue of the concession granted, commandeered the factory, and, to all intents and purposes, it acted as one of their arsenals till the advent of the British troops. Indeed, it is stated that Lord Roberts' guns shelled a train-load of ammunition which was leaving the factory as the troops entered it.

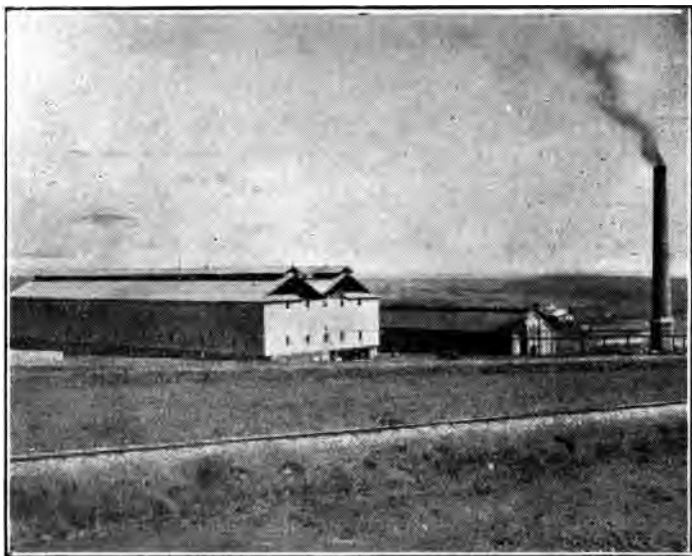
The factory remained under military control till the advent of the Civil Administration, and for about a year of the war period it was the headquarters of the South African Constabulary, the hospital attached to the factory being the central hospital for the entire force.

As a result of the Commission presided over by Mr. Lyttelton, the original concession was cancelled, and following on this, the company was reconstructed, and the headquarters removed from Hamburg to London. The new company went under the name of the British South African Explosives Company, Limited., with Lord Ribblesdale, the present holder of the office, as its first chairman.

The factory lies almost due north of Johannesburg and is distant from it about 13 miles. In many respects the situation is an ideal one—for the manufacture of explosives none better could be desired—for, while the dangerous operations are all carried on on one side of a high ridge, the non-dangerous are carried out on the other, the hill acting as a safety screen. Immense quantities of water are required for the different processes, and in order to obtain and conserve it, three large dams have been built, and the sheets of water give a most pleasing effect to the landscape.

This effect is still further heightened by trees, the old company having planted them very largely while the factory was under construction.

Unfortunately, hardly any of the raw materials necessary for the manufacture of explosives are to be found in sufficient quantity in the country, so they have to be imported. The nitrate of soda necessary for the manufacture of nitric acid and for other purposes, comes direct from



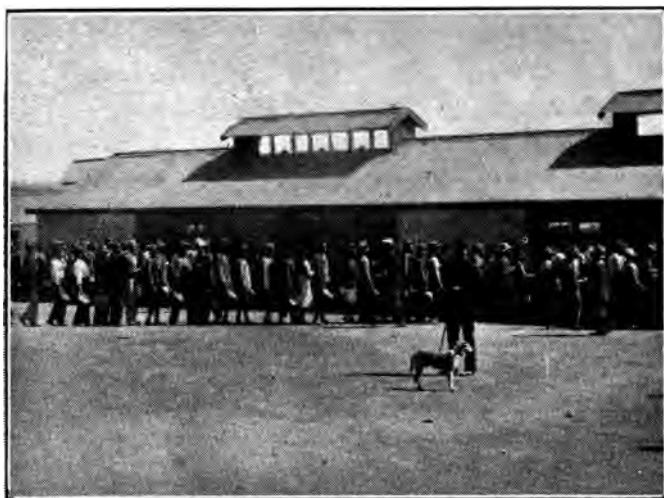
ACID WORKS AT THE DYNAMITE FACTORY.

Chili ; the sulphur for the manufacture of sulphuric acid, from Sicily ; and the glycerine for the manufacture of nitro-glycerine from all corners of Europe.

The acid works, in which the acids already referred to are made, are of great extent, and the plant as a whole is quite up to the most modern ideas.

The actual manufacture of the explosives is carried on in what are called factories, of which there are five—each

one being a complete unit in itself and under the control of an experienced superintendent. The acids ready mixed and of proper standard are handed over to these factories. The nitro-glycerine is first of all made and purified, and after undergoing the various stages of mixing and cartridging the final explosive leaves the factory packed and ready for issue. The principal departments are naturally those already referred to, but subsidiary ones are also carried on, such as



KAFFIRS GOING TO THEIR KITCHEN FOR BREAKFAST.

the making of boxes, cartridge wrappers, ammunition, lead pipes, flour, etc.

The factory employs at present about 350 whites and 1,000 natives. The white employees are housed on the property, and there are two excellent clubs—one for officials and the other for the workpeople. Most of the whites are British, and at the Factory school there is a daily attendance of 100 children. The Company also provides a general library for the use of the employees, and does everything in its power to make things pleasant and comfortable.





WORKMEN'S DWELLINGS AT THE DYNAMITE FACTORY, MODDERFONTEIN

There are, naturally, the usual cricket, football and tennis clubs, but the volunteering movement has appealed more to the community generally, and there are altogether 140 volunteers in the company's service, which is, perhaps, the largest proportion of any community in the country. "The Casino" is a club for the officials of the company, and many pleasant times are obtainable in its recreation rooms. The white employees have a club-room of their own.

On account of the highly technical nature of the work, the staff is much larger than in most other manufactories. Of chemists alone there are 11. Some of these are constantly engaged in research work, others in routine work, and others in supervising manufacturing operations. Each manufacturing department has its own testing laboratory, but the central laboratory, where all the research is carried out, is filled with all the most modern appliances.

Visitors to the Dynamite factory will observe the perfect cleanliness which is preserved in all the rooms where the various processes are carried on. The need for this is obvious, for if dirt or grit of any kind came in contact with the nitro-glycerine the liability to concussion would be increased.

Indiarubber shoes are kept at the entrance to each department, and one enters the door with a sense of respect for power comparable to the reverence that belongs to a cathedral or a mosque.

The danger is small, if proper precautions are taken, but familiarity because of past immunity ought not to be indulged. The natives who carry the blended explosive in india-rubber vessels from room to room do so with a respectful care that is most suggestive; but when the nitro-glycerine is mixed with cotton or other ingredients, so as to form a workable "dough," it is kneaded, run through a small sausage machine and cut into bits about the size of a banana with rapidity and freedom. But the workers take care not to drop the cartridges.

W. C.

## RELIGIOUS BODIES.

### Anglican.

There is no established Church in South Africa. The English Church is exactly on the same footing, so far as the State is concerned, as any other religious body. It is a voluntary association ; the members may adopt, as the members of any other communion may adopt, rules for



S. JOHN'S CHURCH, BELGRAVIA, JOHANNESBURG.

enforcing discipline within their body which will be binding upon those who expressly or by implication have assented to them. Accordingly, the English Church in South Africa adopted in 1876 certain Articles of Constitution which provide a standard of faith and doctrine "according as the Church of England has set forth the same." On this account the Lambeth Conference of 1897 declared the Church of the Province of South Africa to be the only body in these parts which is in full communion with the

Church of England. To give effect to the provisions of the Constitution the Provincial Synod has power from time to time to make Canons, Rules, Regulations and Bye-laws. To enforce discipline, Provincial and Diocesan Tribunals are provided ; but such tribunals have no power to enforce their sentences. They must apply for that purpose to the Courts established by the Civil Law, and such Courts will give effect to their decisions provided that Church Tribunals act within the scope of their authority.



S. MARY'S PARISH HALL, JOHANNESBURG.

The Church of the Province of South Africa is divided into ten Dioceses. The diocese over which the Bishop of Pretoria presides is co-extensive with the territorial limits of the Transvaal. The Bishop is elected by the Clergy and Lay representatives of the diocese, and has four Archdeacons to assist him in the work of supervision. The *parochial clergy* act in concert with their Parochial Coun-

cils, which are elected annually at the Easter Vestries. There are a small number of parochial clergy working in the diocese including members of the Railway Mission and Army Chaplains. There is one Anglican brotherhood represented in the diocese and two Anglican sisterhoods. Pretoria has a Church School for boys and another for girls. There are similar institutions in Johannesburg.

Most members of the Church of England who come to the Transvaal from the Old Country seem to expect to find everything in the way of spiritual ministrations provided for them free of cost, as at Home. They forget that the Church in England has been in existence for centuries whereas the diocese of Pretoria has only existed since 1878.

There are at present one or more resident clergymen at the following 39 places, ministering the white population:—Barberton, Belfast, Belgravia (Johannesburg), Boksburg, Booyens with Turffontein (Johannesburg), Braamfontein (Johannesburg), Christiana, Cleveland, Doornfontein (Johannesburg), Fordsburg (Johannesburg), Germiston, Heidelberg, Jeppestown (Johannesburg), Johannesburg (S. Mary's, S. Saviour's and S. Alban's), Klerksdorp, Krugersdorp, Lydenburg, Maraisburg, Middelburg, Nigel, Nylstroom and Warmbaths, Parktown, Pietersburg, Potchefstroom, Pretoria (Cathedral), Pretoria (S. Mark's), Railway Camp (Pretoria), Randfontein, Roodepoort, Rosettenville, Rustenburg, Standerton, Sunnyside (Pretoria), Volksrust, Wakkerstroom, Waterval Boven, Yeoville, Zeerust. Occasional services are held in addition at 87 outlying places, at some every Sunday, at others once a fortnight, or once a month, and at a few only once a quarter.

Visitors will not be favourably impressed with the structural beauty of the Anglican places of worship; but they must bear in mind that English people were strangers and pilgrims until very lately. The only parochial district that can boast of sufficient wealth to contemplate a church with any architectural pretensions is S. Mary's in the centre of Johannesburg. In the early days of the city some stands were purchased by a few churchmen and presented to the Church, in order that a temporary place of worship might be built and that, if the town grew, the land so given

might be realised and a permanent church erected out of the proceeds of the sale. Before the war, when there was a great demand for general church extension in the Transvaal, a question arose whether the land so given was for the whole diocese, or the Witwatersrand, or simply for S. Mary's Church. The problem was submitted to arbitrators, who decided that the stands in dispute were for S. Mary's parish. Some of the land has been sold, and from the proceeds the S. Mary's Parish Hall has been built—in which the larger meetings of the British Association will this year be held. An imposing permanent church is in prospect of being erected as soon as practicable. A Mission Church (S. Saviour's) in connection with S. Mary's serves the southern part of the district, another (S. Cyprian's) the aboriginals, and a third (S. Alban's) the Cape people.

*S. Augustine's, Doornfontein.*—A fine new permanent church has been partly built (chancel and transepts) at Doornfontein, entirely by the voluntary efforts of the congregation. This Church also supports a suburban mission.

*Christ Church, Fordsburg.*—Mainly by contributions from the Crown Reef Gold Mine Company and its officials a commodious Church has been built at Fordsburg, some two miles to the west of Johannesburg; which, before the war was the only building of any pretensions to be called a church. It is not well attended.

*S. John's, Belgravia.*—Stands in the centre of a pleasant suburb and owes its existence to the enterprising liberality of the Witwatersrand Township Estate Company.

There is a Church of moderate dimensions at Jeppes-town and another at Booysens. Parktown has a Parish Hall, but no Church as yet. Braamfontein has no Church at present, but services are regularly held in an iron room rented from the Dutch Reformed Church. The Government owns most of the vacant land, but is not disposed to donate any of it for religious purposes.

*The Cathedral.*—The Bishop's chair is at Pretoria, and there also Church edifices are very unpretentious. It was contemplated to build a great Cathedral Church as a memorial of the war, but this idea is not likely to be

realised. The Cathedral is responsible for services at Sunnyside, Gezina, the Railway Camp, Arcadia, Valeria, the Prison, the S.A.C. Camp and Pretoria North. The Good Shepherd Mission is for coloured people. S. Mark's, Pretoria, is a small district Church built before the war.

New churches have been erected since the war at Cleveland (East Rand), Krugersdorp (West Rand), Nigel (Heidelberg District) and Roodepoort (West Rand), in addition to those named above. Eighteen more are



ROODEPOORT ENGLISH CHURCH.

urgently required, especially at Braamfontein and the Premier Mine.

About £20,000 a year is required for Diocesan purposes, the greater part of which is raised by subscriptions. A small sum is derived from parochial contributions. The total sum raised by the Diocese during 1904 for all purposes (exclusive of endowments, rents and interest) was £41,740.

*Native Work.*—Very little work is done by Anglicans among the aboriginal population of the Transvaal.

"It is difficult to say how many Anglicans there are in the Transvaal. But it is said that of the white people buried in Johannesburg Municipal Cemetery, no less than two-fifths are buried by the clergy of the English Church. On this basis it would appear that out of the 87,000 white people in Johannesburg Municipality alone, there are 34,800, nominal members of the English Church."—*Diocesan Report, 1905.*

### Baptist.

The first service held by the Baptist Church in the Transvaal was on July 15, 1888, in the Good Templars' Hall, Loveday Street, Johannesburg.

The few Baptists among the early pioneers on the Rand all hailed from Grahamstown, Cape Colony. For some time this was the only Baptist congregation in the country, and work proceeded under great difficulties. In 1890 the congregation moved to a building in Kerk Street, which is now a bicycle repairing shop. The South African Republic granted the Church two stands in Johannesburg, upon which a manse was first built; and, later on, the present Plein Street Church, which was opened on June 28, 1891. This is the "Mother Church" of the denomination in the Transvaal. Amongst the members are to be found men and women foremost in the ranks of Christian work in Johannesburg. The Church itself is full of activity. About the same time work was commenced in Pretoria. Several pastors laboured in that field, all with a measure of success. For some years the German Baptists had a church at Mayfair, Johannesburg.

Offshoots of the Johannesburg congregation have been planted at Krugersdorp, Boksburg, Troyeville and Germiston. The work at Krugersdorp became an independent pastorate in 1896. The present place of worship is built on stands given by the Boer Government. Steady and continued progress has marked the history of the cause there. *The same may be said of Boksburg. The Troyeville*



Church, built in the centre of one of the best residential suburbs of Johannesburg, is very "go-a-head."

The "Mother Church" started new work at Germiston early in 1894. A stand has been bought and a suitable place of worship erected.

Wakkerstroom has had a Baptist congregation since 1896. A place of worship was opened in 1905 at Brakpan Colliery through the zeal of the Boksburg congregation. In 1905 a new church was opened at Roodepoort.



THE BAPTIST CHURCH, PLEIN STREET, JOHANNESBURG.

In 1890 the Churches then in existence formed themselves into "The Transvaal Baptist Association," which in 1898 was merged into "The Transvaal Baptist Church Council." This has since been incorporated.

*Native Work.*—Missionary work has been carried on by individual Churches for years. In one case a very large "field" has been worked by means of native evangelists. The Transvaal Baptist Church Council early in the year 1903 decided to make a forward movement in this direction; the result of which has been the formation of the Transvaal Baptist Missionary Society.

A superintendent for missionary work has been appointed, with the Pretoria Native Location as headquarters. A local committee is "working" the mines adjoining Johannesburg by means of European lay helpers and a native evangelist.

D. W. R.

---

### Congregational.

The Congregational is among the least of the churches established in the Transvaal. It was late in planting, and has been somewhat slow of growth, but it is beginning to put forth its branches.

New churches are in progress in several places. Its principal church for white people is in Bree Street, Johannesburg. Among the Cape coloured population, however, this denomination is especially strong. Five new churches have been opened this year; a new school-room, called "Milner Hall," a new manse for the senior minister and superintendent, and a hall for a Young People's Christian Association were completed in 1905.

The church is largely of the Institutional type, and the last building mentioned will, it is hoped, do much for the intellectual and moral, as well as spiritual, development of the members.

On a small scale, this Denomination is endeavouring to maintain the old Puritan traditions. It contends for large liberty in every sphere of life, and would extend the bounds of freedom from precedent to precedent. A very excellent monthly magazine, called "The Outlook," with a considerable circulation, is published by the Bree Street Church.

C. P.

---

### Dutch Reformed Church.

Visitors to South Africa are always impressed by the prominence given to religion by the Dutch, who, whenever they laid out a township, allotted the centre of the main *public square* as a site for a place of worship. That *custom came* with them to the Transvaal, and the buildings

they erected for worship were always the finest in any town until commercial interests overshadowed everything.

The original Dutch Church in South Africa was the *Nederduitsch Hervormde Kerk*, which formulated opinions founded on the methods of Luther, Zwingle and Calvin. It was established first in Cape Colony. After a while some of its members "adopted liberal views" with regard to the Divinity of Christ. This caused the more ortho-



THE DUTCH REFORMED CHURCH, BRAAMFONTEIN.

dox, who were also the greater number, to separate and form the *Nederduitsch Gereformeerde Kerk*; and this became the recognised Dutch Church of Cape Colony, Orange River Colony and Natal.

Members of the *Hervormde* and also of the *Gereformeerde Kerks* were among the original colonists who trekked to the Transvaal, and, as either school of thought preponderated in a settlement, the *Hervormde* or the

Gereformeerde Kerk would be established.. The war of 1881 brought members of both Kerks into closer fellowship, and common interest pointed the way to reunion. After that war, therefore, nearly all the congregations of both Kerks agreed to form an united community, which is now known as the Nederduitsch Hervormde of Gereformeerde Kerk. It is consequently the largest Dutch religious body in the Transvaal. A few irreconcilables of the Hervormde Kerk still hold back from unity, but they have only four small congregations.

There is, however, a third section of Dutch Christians, known as the "Dopper" Church; of which the late President Kruger was a prominent member. The word "Dopper" comes from *Doppe*—a cup or basin—and has reference to the way male members of the community used to cut their hair. The Doppers are the Quakers of the Dutch community, and some of them still affect singularity of attire. Their first pastor in the Transvaal was Herr Postma, who had previously founded a Theological Seminary at Burgersdorp in Cape Colony. Theologically there is little variation between the Kerks, and the chief difference seems to be that the Doppers refuse to sing hymns and will only sing psalms.

To the Hervormde of Gereformeerde Kerk belong all the large Dutch places of worship in the Transvaal. It is established in every important town, and is represented by 38 different congregations. The confirmed members in 1904 numbered 35,982 persons; and the family rolls totalled 76,234 souls.

M.

### Hebrew Congregations.

A few Jews lived in the Transvaal long before the "seventies" of the last century. M. de Vries, a Dutch Jew, was State Public Prosecutor in 1868 and Chairman of the Volksraad in 1872. In 1869 he received the public thanks of the State President for his services in connection with the ratification of the Treaty with Portugal. Religious Services were inaugurated at Pretoria in 1876 by Daniel M. Kisch, F.R.G.S., Adviser to Lobengula from 1868 to 1873, and later, Auditor-General of the Transvaal during

the first British occupation, 1877-1881. In 1878 a Jewish cemetery was consecrated at Pilgrim's Rest; in 1883 regular services started in Vryheid in the then new Republic; and in 1885 on the Barberton gold-fields.

In 1886 Jewish services were first held on the Witwatersrand, and in July 1887, the "Witwatersrand Old Hebrew Congregation" was organised, which erected the first synagogue structure in the Transvaal on Nov. 9, 1888. Four years later, the "Johannesburg Hebrew Congregation"



OLD HEBREW CONGREGATION SYNAGOGUE IN JOHANNESBURG.

(Park Synagogue) and the "Beth Hammidrash" dedicated two new synagogues. Since then, synagogues have been opened at Pretoria, Heidelberg, Volksrust, Klerksdorp, Boksburg, Krugersdorp, Germiston, Roodepoort, and several in the suburbs of Johannesburg. The principal Jewish schools are the Government Jewish School, with 530 children, at Johannesburg, and the Miriam Marks School at Pretoria.

The Jewish charities in the Transvaal are, as everywhere, well organised. The Johannesburg Helping Hand and Burial Society (founded in 1887) has a membership of 2,000, and spends over £4,000 per annum in poor relief.

Johannesburg is also the seat of the South African Jewish Orphanage, the Executives of the South African Zionist Federation and the Jewish Board of Deputies for the Transvaal and Natal. It also possesses two Jewish newspapers and a number of miscellaneous Jewish societies.

The Jewish population in the Transvaal cannot be much under 25,000. It has always formed an integral portion of the business, intellectual, social and political life of the Colony, and has contributed its full share to the development of the country. There were seven Jews among the sixty-four reformers imprisoned at Pretoria in 1896. Jews participated in the Uitlander movement of 1899, and some of them joined the irregular British forces during the war. There were also Jewish "irreconcilables" who fought under the Vierkleur to the bitter end; and scores of Jewish prisoners were to be found at St. Helena, Bermuda and Ceylon.

J. H. H.

---

### Presbyterian.

Presbyterianism in the Transvaal commenced at the time of the discovery of gold on the Witwatersrand. Before then Scottish settlers were dependent for religious services either upon the Dutch Reformed Church, which has a Presbyterian government, or upon other English speaking Churches. In June 1887, the Presbytery of Natal started what is now St. George's Church in Noord Street, Johannesburg, the largest Presbyterian Church in South Africa. Two years later another minister was appointed for Germiston and Boksburg, and in 1890 the Pretoria Church was constituted. These three congregations were then constituted as a separate Presbytery. Since 1890 the work of the Church has steadily progressed, and new charges are continually being inaugurated.

Fordsburg was the first suburb to be occupied. A substantial church and manse have been built there. The Jeppestown work began in 1894; a modest hall was opened for services in 1897, succeeded in 1904 by the handsome St. Andrew's Church in Commissioner Street. *Another Church* was established in 1897 in de Korte



PRESBYTERIAN CHURCH, JEPPESTOWN.

Street, Braamfontein. Since the war a new congregation has been formed in Yeoville. A hall for worship is in process of erection. Similar progress is evident in other towns of the Transvaal. The congregations of Germiston and Boksburg were disjoined in 1896 and ministers appointed to each. A fine church hall and manse are now being erected at Germiston to take the place of the temporary building hitherto used. Boksburg has had a commodious hall and manse for some time. New congregations have been formed at Springs, Middelburg,

Potchefstroom, Krugersdorp and Standerton, and preaching stations, with regular services, have been erected at Heidelberg, Turffontein, Modderfontein (the dynamite factory), and the Premier Diamond Mine.

*Native Work.*—The Kaffrarian Presbytery of the United Free Church of Scotland has extensive missions and schools in the Zoutpansberg district, where the native population is densest, while the Transvaal Presbytery itself has a large mission on the Rand and in Pretoria. A staff of evangelists carries on services in eight stations on the Reef, and in the native church at Pretoria. A noteworthy feature of the Presbyterian Church of South Africa is that its members are drawn from all branches of the Presbyterian Church in Britain, each of which has sent men and money to aid the work in the Transvaal. R. B. D.

### Roman Catholic.

The first permanent establishment of this community in the Transvaal was at Pretoria where the late Bishop Jolivet arrived with the Loreto Sisters in 1887; but previous to that date the late Father Walshe, O.M.I., had visited several places in the Transvaal, especially the Lydenburg gold-fields in 1875.

Permanent churches are now erected in all the principal centres of the Transvaal. The clerical staff in 1905 consists of one Bishop and 25 priests. There are 18 Marist



THE ROMAN CATHOLIC CHURCH, JOHANNESBURG.

Brothers, and between 120 and 130 members of different religious sisterhoods now engaged in scholastic and charitable institutions in the Transvaal. There are between 8,000 and 10,000 members of the church in this country. The principal churches are in Johannesburg, Pretoria, Potchefstroom, Lydenburg, Pietersburg, Barberton, Germiston and Krugersdorp.

*Educational.*—There are five convent schools in Johannesburg, viz., Parktown, Doornfontein, Braamfontein, Fordsburg



and President Street East. Pretoria, Lydenburg, Potchefstroom, Klerksdorp, Heidelberg and Krugersdorp have each a convent school. At present the community has only one school exclusively for boys in the Transvaal, and that is the well-known Marist Brothers' school on Hospital Hill, Johannesburg. In this school there are about 500 boys.

*Charitable Institutions.*—"Nazareth House," Yeoville, Johannesburg, provides for orphans of both sexes and children of poor parents, and for the aged and destitute poor of both sexes. Including the Sisters (15), the Institution provides for nearly 500 inmates, and is completely dependent on public charity, which, to the honour of the Transvaal, but especially of Johannesburg, has never failed.

The present unfinished building has cost up to date nearly £40,000. The whole work of the Institution is carried on by the Sisters and children; no servants are employed, with the exception of a couple of Kaffirs who are employed in stable and garden work.

"The Sisters of the Good Shepherd" were established in Johannesburg during 1904. Their principal work is to reclaim the fallen and inebriate of their own sex. This work depends at present almost entirely on public charity, helped by the plain and ornamental needlework given them.

DE L.

---

### Wesleyan.

The Wesleyan Church in Cape Colony, Natal and the Orange River Colony, with some 400,000 adherents, is under a separate Conference, but the Transvaal and Swaziland District is still administered from England, under a Chairman and General Superintendent.

The work of the Church in the Transvaal was commenced by a devout native, who came up with a Boer in the Great Trek in 1836. In 1870 European ministers were sent to take up both English and Native work. In the earlier days a number of English day schools were carried on, but these have not been resumed since the war, as the Church is content that elementary education, at any rate, should be in the hands of the Government, so long as the Bible is not disallowed in the Government schools.

The following are some of the statistics for the year 1904:—

European Ministers, 53; Native Ministers, 20; Churches, 242; other places of worship, 400; Sunday School teachers, 672; Lay Preachers, 929; members of the Church, 22,098; Baptisms in 1904, 4,107; scholars in English Sunday Schools, 4,800; scholars both Native and English, 11,339; voluntary offerings in 1904, £39,000.

These statistics furnished by the General Superintendent tell their own tale of enterprise and progress. The vigour and completeness with which the Wesleyan community organises, are universally acknowledged, and up to the time when war broke out in 1899, Wesleyans had by far the largest following among English religious denominations. One of the first public acts performed by Lord Selborne as Governor of the Transvaal was to lay the foundation stone of extensions to a Wesleyan Church at Fordsburg, which when completed will hold 850 worshippers. A. B.

---

### CENTRAL SOUTH AFRICAN RAILWAY.

Up to the year 1890 there were no railways in the Transvaal, but during that year a "tram-line" was laid between Springs and Roodepoort to facilitate traffic along the Reef. (There is now a double line of rails on that route.)

Meanwhile, and owing to the difficulty of obtaining food supplies for the mines, arrangements were sanctioned for bringing the Transvaal into railway communication with coast ports. During 1901 several sections of line were constructed in order to connect with the Cape Government Railway system. The final section (Vaal River to Germiston) was opened September 15, 1892, thus establishing direct communication between Johannesburg and Capetown. The section between Germiston and Pretoria was opened on New Year's Day, 1893.

The line from Pretoria to Delagoa Bay was in progress during the same period, but not completed until November 18, 1894. A third line from Germiston to the Natal border *was then well under way*; the opening of the Heidelberg

Union Section taking place on December 15, 1895. There are thus three routes from the coast for Transvaal traffic; the chief ports for goods being Durban and Lourenço Marques. No small friction is at times occasioned lest one of those ports should obtain undue advantage over another. Port Elizabeth and East London are also utilised as ports of entry for heavy goods traffic.

The total length of line constructed up to April 1903, measured 1,387 miles. Since then several new branch lines have been opened, which, with others under construction on December 31, 1904, will bring the total mileage up to 2,654 miles; so that the works set on foot since the war have practically doubled the Transvaal railway system. Many Boers whom the war impoverished have been employed on these construction works.

A new through connection has been made by a line from Vereeniging to Johannesburg *via* Langlaagte, instead of through Germiston. This brings the commercial centre some hours nearer to Capetown than formerly. A section of the Springs-Eastward line was opened at the beginning of August 1905.

The line is a narrow guage (3' 6"), but the rolling stock overhangs the wheels more than in Europe, and, therefore, the available carriage space is about the same. But a narrow guage is an obstacle to great speed. An average of 30 miles an hour is the most that the fastest passenger trains are able to accomplish.

*Train Mileage.*—In 1903 this was 9,157,567 miles; in 1904 it was brought down to 7,418,243 miles, owing to the importation of more powerful engines, and better working.

*Catering.*—This service on the Transvaal railways used to be let out to contractors; but in 1904 it was brought more directly under the control of the Traffic Department with very great advantage to the travelling public.

*Sanitation.*—This leaves much to be desired. The lavatory and waiting room accommodation at Pretoria Station is of the most primitive character.

The European salaried staff of the railway on Dec. 31, 1904, was 1,531 persons and the daily paid staff, 3,211.

There is besides a large amount of native labour employed on the railways; and the Railway Report for 1904 states that no difficulty has been experienced in getting all the labourers required. High fees used to be paid for recruiting native labour, but these are no longer necessary because more natives volunteer for the work than there is work for them to do. Compounds are provided for natives at Pretoria, Johannesburg and Germiston.



A SALOON COACH ON THE C. S. A. R.

The Railway Administration has spent in the past so much money for imported timber that it has recently voted £5,000 a year for ten years "for the planting of trees best suited to the soil and climate for use at the proper time as railway sleepers and for other railway purposes."

Travellers will notice that most of the country railway stations are flanked by clumps of trees including many fruit varieties. Planting and gardening in the intervals between the trains has a salutary effect on the staff of the smaller

stations. In other directions the Railway Administration evinces its interest in the welfare of employees in order to attract steady men. £100,000 was voted during 1903-4 for providing suitable housing at the Braamfontein Depot, Johannesburg, and elsewhere; "the rents of which are kept as low as possible consistent with a return towards payment of interest on capital." This has proved so great a boon to railway workers in view of the extraordinarily high rents which are charged by private landlords for house accommodation, that a further £100,000 is about to be expended in a similar direction, that the staff may be adequately housed. The average pay of the salaried staff is £223 7s. 5d. per annum, and that of the daily paid staff £203 7s. 3d. These rates of pay seem high at first sight to European visitors; but not when the corresponding cost of living is taken into account.

Railway Institutes and Clubs have been established at different centres, which encourage the staff in mental recreation and out-door sports. The usual sick, etc., funds are in operation, and a superannuation fund in course of formation, and it is proposed to provide Training Institutes for practical education in Railway Working.

New headquarter offices have been built during 1905, close to Park Station, Johannesburg; in which provision is made for a library of standard literature on railways and their administration.

Taking it all round, the Central South African Railway, although much abused by the merchants on account of high traffic rates, may be described as anxious to do its best for its patrons and its servants. But in this, as in every other important matter, the perfectness of old established European systems will not yet be looked for by thoughtful travellers. They will rather wonder that so much has been done in so little time in face of so many difficulties.

The gross railway earnings for 1904 were £4,587,779  
The working expenditure during 1904 was £2,885,149

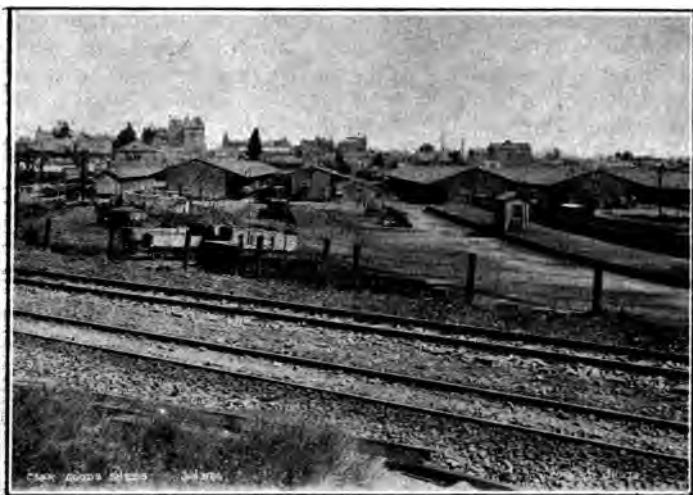
---

Net earnings £1,702,630

---

The total railway traffic dealt with by the system during 1904 was 4,238,851 tons. The number of passengers carried during 1904 was 5,468,366.

C. A. L.



THE KAZERNE (GOODS STATION), JOHANNESBURG.

### Elementary Education.

The present educational *régime* dates from the last few months of the year 1900, when schools were opened in Pretoria under the Military Governor. In 1901 the schools in Johannesburg began to reopen; the system of education in the Concentration Camps was started, and schools on the line of rail were instituted or renewed. In 1902 the establishment of farm schools (to avoid any break in the education of the many thousands who went back to their homes from the Concentration Camps, where one year's tuition had been given) was a natural tendency, while *further* extension away from the railway was promoted *wherever possible*.

In 1903 an Education Ordinance provided for a system of free elementary education for children of European descent on both sides, for Higher Technical and Mining Schools, for schools for coloured children, and grants in aid of native schools to the various missionary agencies. Defective and incorrigible children were also legislated for.

State control on undenominational lines (modified by a delegation of certain advisory powers to local bodies, and the "right of entry" to supplement undenominational education) is the present method. The numbers in Govern-



A JOHANNESBURG PUBLIC ELEMENTARY SCHOOL.

ment schools have more than doubled since the outbreak of the war, and stand to-day at approximately 30,000; of which number some 10,000 are on the Rand; but, judging from Census returns, it is clear that a very considerable number of children do not attend any school. For administrative purposes, the Transvaal is divided into inspectorial districts coinciding, generally speaking, with Magisterial areas, the whole being controlled from Pretoria.

Examinations, other than the school examinations, are not recognised in primary schools; but the lower and leaving certificate examinations may be supplemented by examinations of the University of the Cape of Good Hope High Schools.

Home work, sport, volunteering and libraries are encouraged as part of the school life outside school hours, which run in summer for five hours with short breaks, and in winter as far as possible in two sessions with a long interval for the mid-day meal. Long periods on a farm are necessarily trying to teachers, and efforts are always made to exchange town and country teachers with a view to lightening the isolation which exists in districts remote from the railway.

The ravages of war, and most pressing deficiencies in buildings and equipment, have been partially replaced by an apportionment of the loan, but the interim and future development has not been fully coped with, nor can the programme be carried out under several years, without a considerable yearly vote. Johannesburg and Pretoria were more fortunately placed in the matter of buildings at the conclusion of hostilities, and the former city benefited in this respect from the good work of a Council of Education prior to the war; but the development in both centres has counterbalanced the advantages. A fully equipped system of schools in the capital and on the Rand requires a large outlay, without reckoning on a very large and certain increase in population in the near future.

The necessary supply of teachers at the outset could not be fully met from the men and women of the Colony; and their number had to be supplemented by the importation of certificated members of the profession. These were drawn from the British Isles, Canada, Australia and New Zealand. A Normal College has, however, come into existence—the pupil-teacher system being discouraged—and the majority of teachers will in future be Colonists trained therein. The course is at present of one year's duration, but it presupposes certain academic qualifications. Later on the college course will be extended over two years.

*The Education Department anticipates that it will in*



future be able to build Town Schools at a cost of from £15 to £20 per head. The cubic space allowed per child will be 150 feet (12½ feet floor space) for children who have passed the first standard; and 10 feet of floor space for each infant. Several schools have been built of the type shown in the foregoing illustration. G. L.

---

### The Transvaal Volunteers.

Speaking at a banquet given in his honour at the conclusion of the War, Lord Kitchener urged his audience not to forget the lessons of the campaign, but to keep up the organisations of their "distinguished regiments." He then announced that he had been able to arrange with the Home Government and Lord Milner that 500 each of the First and Second Regiments of the Imperial Light Horse, South African Light Horse, Scottish Horse and Johannesburg Mounted Rifles should retain without preliminary cost their horses, rifles and equipments. To Lord Kitchener's initiative the formation of a Volunteer Force in the Colony may thus be attributed.

A Committee was formed, consisting of several influential residents who were known to be interested in the movement, with the object of determining the lines on which it would be most advisable to commence. The Committee recommended an organization, which was adopted, and also drew up the Volunteer Regulations.

The organization adopted followed the scheme outlined by Lord Kitchener, with the addition of four infantry corps, the Central South African Railway Volunteers, the Transvaal Light Infantry and the Transvaal Scottish; the establishment of the infantry being fixed at, roughly, 800 men per corps.

In October, the Volunteer Corps Ordinance, 1902, was published, authorising the formation of the force on the above basis. Recruiting was commenced in earnest in December 1902.

Exclusive of the Witwatersrand District in which all these corps (except the Left Wing I.L.H., whose head-

quarters were fixed at Potchefstroom) were allowed to recruit, the Colony was divided into five divisions, each of these divisions being allotted to one mounted corps, as follows :—

Elandsfontein District, S. A. Light Horse.

Marico and Potchefstroom District, Left Wing, Imperial Light Horse.

Standerton District, Johannesburg Mounted Rifles.

Middelburg District, Scottish Horse.

Pretoria District, Northern Rifles.

The C.S.A.R. Volunteers were confined to employees of the Central South African Railway, and the remaining Infantry Corps to the Witwatersrand District.



THE DRILL HALL, JOHANNESBURG.

In March, 1903, the necessity of a Medical Unit was recognised and the Transvaal Volunteer Medical Staff Corps was formed, with headquarters at Johannesburg, but allowed to recruit in any district of the Transvaal. The establishment was fixed at, roughly, 400 men.

In May, 1903, several offers of raising volunteers in *Pretoria* having been received, it was decided to raise a

Composite Corps, with headquarters at Pretoria, to be called the Northern Rifles, to which the whole of the Northern Transvaal should be allotted for a recruiting area; the establishment being fixed at, roughly, 600 mounted men and 400 infantry.

In the same month it was thought advisable to form a corps in connection with the mines, in order to tap the large amount of material there available; consequently, the Witwatersrand Rifles, with an establishment of, roughly, 1,200 men, was raised.

Soon after the commencement of the movement, the Chief Staff Officer, Transvaal Volunteers, Lieut.-Colonel J. E. Capper, R.E., resigned, and was succeeded in January 1905, by Lieut.-Colonel A. H. M. Edwards, C.B.

At the end of the first year, that is, on June 30, 1903, when the Force had been in actual existence for eight months, the results were as follow:—

Corps.	Enrolled Strength.	Efficients.	Non-Efficients.
Mounted Volunteers	1,969	1,518	451
Infantry	1,812	1,079	733
	<u>          </u>	<u>          </u>	<u>          </u>
Totals	<u>3,781</u>	<u>2,597</u>	<u>1,184</u>

It is interesting to note that of the efficients no less than 2,224 had either seen service in the late war or elsewhere.

The cost of raising and maintaining the Force for the first eight months of its existence amounted to about £99,000, or a cost of £26 4s. per head of the Force.

During 1904, the second year of its existence the Volunteer Force increased materially, both in numbers and efficiency, and a Volunteer Battery of Artillery was formed, with an establishment of about 130. The Cadet movement was also commenced, 718 boys being enrolled by the end of the year.

The cost of maintaining the Force during the year amounted to about £143,400, which works out at a cost of about £30 per head of the Force.

During the year 1905 several important alterations and additions in the organisation of the volunteers were made, the most noticeable being the formation of two Composite District Corps, with establishments similar to that of the Northern Rifles; they are, the Western Rifles, with headquarters at Potchefstroom, absorbing the Left Wing, I. L. H., and having as its recruiting area the whole of the Western Transvaal, and the Eastern Rifles, with headquarters at Standerton, having as its recruiting area, the whole of the Eastern Transvaal.

Another great alteration has been made in regard to the organisation of the Cadet movement. This is now established on a regimental basis, three battalions being on the Witwatersrand and one at Pretoria; this system was adopted, as the former one of attaching Cadets to volunteer units, proved unsuccessful.

Headquarter Offices and a Drill Hall, near the Union Ground, which were commenced at the beginning of 1904, were completed about September, and have proved a great acquisition.

The Drill Hall is believed to be the largest in South Africa, its dimensions being 150 x 80 feet.

As musketry practice is rightly considered a most important part of the training of the volunteer, very satisfactory range accommodation has been provided, the total number of ranges now erected being 24.

On the largest of these, the Booysen's Range, near Johannesburg, the Annual Transvaal Bisley is held, lasting 10 days, when shooting men from all S.A. Colonies compete.

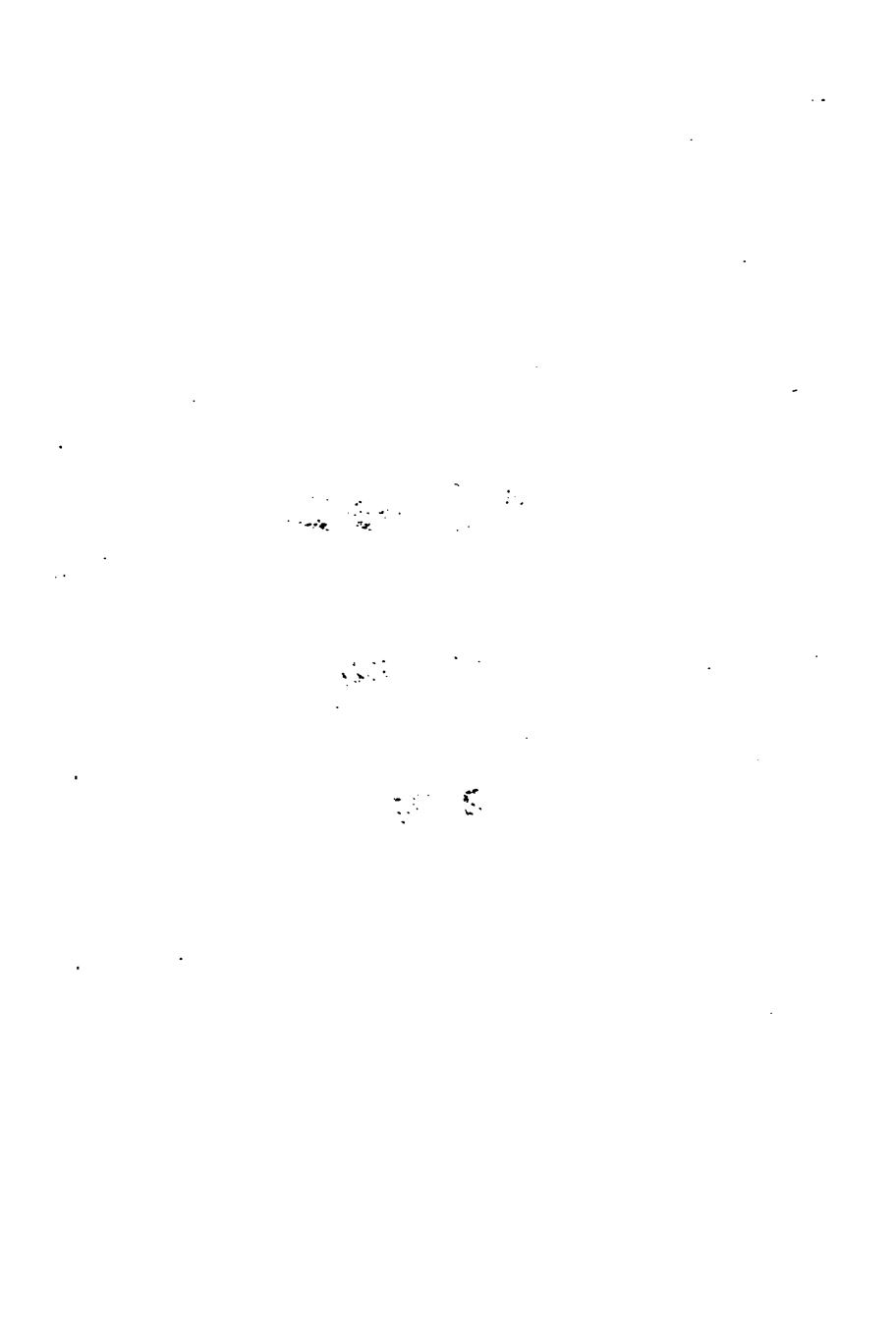
The permanent Staff, which is made up largely of officers and non-commissioned officers drawn from the Regular Army, is employed under the commandant to organise and administer the force, and consists of a head quarter-staff for the whole force and one adjutant and a proportion of sergeant-instructors to each corps.

An annual camp of exercise is held at Easter, lasting for about 4 days, during which a large proportion of the volunteer force carry out their training. The first year the camp was held 2,267 volunteers attended; this year 3,141 attended.

[E. A. B.]

THE END.







3 2044 004 492 567



